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ABSTRACT

The new "Mathematics Framework for California Public Schools" identifies complex instructional activities and student performance, and requires new assessment methods to reveal that performance. One of the goals of the California Assessment Collaborative (CAC) is to study the effects of local assessment development and implementation efforts on teaching and learning. This report describes how one local CAC mathematics assessment initiative connects with the statewide curriculum reform and impacts what occurs in the classroom. The Mt. Diablo Curriculum-Based Alternative Assessment of Mathematics (CBAAM) was the program examined through interviews of 59 third-grade teachers. Their responses made it clear that the CBAAM had profound short-term effects on teaching and learning. Teachers resequenced content, introduced new content, and emphasized instructional processes as a result of the CBAAM. Evidence also suggests that there will be substantial long-term impact. Two tables present study findings. Two appendixes supplement the report with a student booklet from the 1994 Curriculum-Based Alternative Assessment of Math, the third grade survey letter, and interview guiding questions. (Contains 18 references.) (SLD)

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# Teacher Perspectives of the Impact and Validity of the Mt. Diablo Third Grade Curriculum-based Alternative Assessment of Mathematics (CBAAM)

A Report Prepared
for the California Assessment Collaborative

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September 1994



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# Teacher Perspectives of the Impact and Validity of the Mt. Diablo Third Grade Curriculum-based Alternative Assessment of Mathematics (CBAAM)

By
Peter Ryan

Far West Laboratory for Educational Research and Development

A Report Prepared for the California Assessment Collaborative

September 1994

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Teacher Perspectives of the Impact and Validity of the
Mt. Diablo Third Grade
Curriculum-Based Alternative Assessment of Mathematics (CBAAM)

## I. Introduction

In California, a major component of educational reform involves linking both state and local assessment to new curriculum frameworks. The new Mathematics Framework for California Public Schools (CDE, 1992) identifies complex instructional activities and student performance, and requires new assessment methods to reveal that performance. Although the demands are present and many districts are initiating assessment reforms, there is a paucity of research and information on how newly developed assessment strategies impact teaching and learning in classrooms. One thing is certain; any real impact of the present wave of reforms will be mediated through the knowledge and actions of teachers. Therefore, identifying the effects of teacher participation in assessment development and the assessment's impact on teachers' day-to-day practice is a timely and informative venture.

Since 1991, Far West Laboratory for Educational Research and Development (FWL) has partnered with the California Assessment Collaborative (CAC) to study the effects of local assessment development and implementation efforts on teaching and learning. The CAC was designed to systematically identify, validate, and disseminate alternatives to standardized testing throughout the state. The initial phase of the CAC's research involved synthesizing information from many diverse assessment initiatives and developing a conceptual model portraying the many components necessary for the design of "instuctionally sound assessments." Five key dimensions identified and elaborated by the conceptual model include: articulating content standards, developing meaningful and fair assessments, developing teacher capacity to use assessment information to improve instruction, developing student capacity to use assessment to improve learning, and determining and monitoring consequences (Jamentz, 1993).

The research reported herein builds on the early work of the CAC and places that work in the context of the statewide mathematics reform effort. This report describes how one local

CAC mathematics assessment initiative connects with the statewide curriculum reform and impacts what occurs in classrooms. The research was designed, in part, to help the school district understand the impact of the assessment reform, and to provide information that could assist the district with decisions relevant to the future course of the project. In this context, the Mathematics Framework, corresponding state assessments, and local assessments represent a system in transformation. The system will only work for students to the extent that sound reform strategies play out in their schools and classrooms. Local commitment converging on a coherent program of curriculum development, teacher professional development, and instructionally sound assessment is the linchpin of the larger mathematics reform effort. In this study, the Mt. Diablo Curriculum-Based Alternative Assessment of Mathematics (the CBAAM) initiative was the point of entry. However, based on the early work of the CAC, it was anticipated that this study would come full-circle generating substantial information on the nature of classroom instruction and the professional development supporting its implementation. Thus, data collection and interpretation was guided by the following clusters of research questions:

1) *What is the impact of the CBAAM on the mathematics instruction delivered by third grade teachers? How does knowledge of the assessment content alter the patterns of instruction? Do teachers use the CBAAM results? If so, how do they use the assessment results as an instructional tool?*

2) *Does the CBAAM contribute to teacher professional development? Does it help teachers articulate ideas forwarded by the 1992 Frameworks? Does it illustrate and communicate important ideas? Does the CBAAM implementation, or use of the CBAAM results foster within and across grade articulation of mathematics programs? Are there systematic differences in the opinions and actions of teachers involved in the CBAAM activities versus those not participating?*

3) *What do teachers think about the development process and the quality of the CBAAM itself? Do teachers think the CBAAM is instructionally sound? If not, where does it fall short? What changes do they recommend?*

## II. Background

### Curriculum and Instruction in Mathematics

This section reviews recent trends in mathematics assessment and instruction and identifies several forces that have motivated change. The alignment of assessment and instruction, research in cognitive psychology, instructional guidance in the form of standards and frameworks, and the critical role of teacher professional development are discussed.

Mathematics Assessment and Curriculum. The shift from externally produced assessment procedures to locally developed performance-based assessments reflects a major departure from traditional practice in many school districts. Historically, the alignment between traditional tests and the mathematics curriculum has been quite good. Analysis of curriculum and assessments reveal that the current mathematics content being covered is limited. Reviews of both criterion-referenced and norm-referenced tests reveal items that focus on: 1) basic procedures for computation; 2) traditional word problems that involve recognition and direct application of basic algorithms (Madaus, West, Harmon, Lomax, & Viator, 1992); and 3) the recognition of various shapes, quantities, and measures. Likewise, mathematics programs throughout the country have focused on a limited range of student performance. Gehrke, Knapp, and Sirotnik (1992), graphically describe this rather bleak scenario. In contrast to other subjects, mathematics instruction exhibits a narrow range of instructional formats where lecture, individual seatwork, applying the right algorithm, and getting the right answer dominate. Instruction emphasizes procedural skills, focuses on a narrow range of topics, and repeats material in an increasingly redundant fashion as students move through the grades. Little attention is given to conceptual understanding, complex problem solving, or real-world applications. Additionally, studies have found that mathematics gets much less attention compared to reading and language arts in the elementary program (about 40 minutes a day compared to 150 minutes in reading and language instruction) and that most of this time is spent on basic arithmetic (Bell, 1974; Porter, 1989; Rowan, & Guthrie, 1988 ). In general, children are not exposed to the range and depth of mathematical ideas necessary to develop the depth of understanding forwarded in the frameworks. Mathematics curriculum and instruction is changing, but significant change takes considerable time and

effort. Teachers are not only changing how they assess their students, but altering the ways in which their students come to know mathematics content.

A Perspective from Cognitive Psychology. A major component of the reform in mathematics instruction involves viewing learning, curriculum, and assessment from a cognitive perspective. In the past, both mathematics curriculum and assessment focused on mastery of basic routine skills. This state of affairs was consonant with early learning theories that suggested complex, higher-order skills were acquired bit-by-bit by chaining prerequisite knowledge. However, during the past decade, research in cognitive psychology indicates that all learning, particularly complex reasoning and understanding, is the result of active construction by the learner (Shepard, 1992). In fact, even the most basic skills requiring memorization and recall of facts involve mental elaboration and judgement (Resnick & Resnick, 1989). Resnick and Resnick conjecture that often students fail to recognize the connections between formal rules taught in school and their own mathematical intuitions. Students think of school math as something different and do not integrate this with their practical knowledge of the real world. Often, math is taught, and students are asked to demonstrate mastery, in decontextualized situations. The students are then left with the difficult task of recontextualizing and integrating this information into their own knowledge base. New approaches to instruction and assessment are designed to connect mathematical knowledge to students' daily experience. This places enormous demands on teachers and educational institutions to enhance their own capacity to design and implement new approaches to mathematics instruction and assessment.

Standards and Frameworks. There is significant interest in redirecting what has been taught and assessed to what *should* be taught and assessed. Much of this work has been inspired by the National Council of Teachers of Mathematics (NCTM). The Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989) reflect a national consensus on what curriculum and assessment in mathematics should look like. The standards emphasize broad coverage of mathematical ideas, the conceptual underpinnings of tools and procedures, application of mathematical ideas to real-world situations, and instruction that encourages learners to formulate multiple solutions to complex problems. The NCTM standards provide compelling arguments for the integration of group collaborative work, open-ended tasks and

investigations that may take hours or days to complete, and the use of manipulatives and multiple representations of mathematical ideas. Implementing these new standards and corresponding assessments will be difficult because they represent a departure from past and current practice in many schools.

Mathematical Power. The revised Mathematics Framework for California Public Schools (CDE, 1992) addresses many of the challenges presented in the NCTM standards and builds on and extends the ideas in the 1985 framework. This new framework has as its central goal the development of *mathematical power* for all students - "the ability to discern mathematical relationships, reason logically, and use mathematical techniques effectively" (Mathematics Framework, 1992, p.3). The document describes four dimensions of mathematical power, including mathematical thinking (e.g., classifying, comparing, inferring, verifying); communication (coherent expression of thoughts and results); mathematical ideas (content, e.g., counting, addition, geometry); and tools and techniques (e.g., computational algorithms, visual organizers, manipulatives, calculators). Students employ these four dimensions of mathematical power to perform work that is purposeful and personally meaningful. Instruction and assessment focus on the broad demand for mathematical power through coherent units that emphasize large pieces of work. Redesign of assessment practices at state and local levels are necessary to capture these complex student performances.

Professional Development. Research and experience with past reforms indicate that most efforts to fundamentally alter teaching and schooling have had modest impact, at best. Changes usually consist of piecemeal adoption of new practices, or the translation of new ideas into old practices (Cohen & Spillane, 1992). There is also a sense that most elementary teachers lack a deep understanding of mathematics themselves, compounding the difficulty of improving curriculum and instructional practice. Although most elementary teachers must teach mathematics, few feel well qualified because of a teacher preparation system that perpetuates a secondary role for mathematics and instructional time allocations that are grossly inadequate (Bell, 1974; Gehrke, Knapp, and Sirotnik, 1992; Porter, 1989). Although guidance for systemic improvement in the form of mathematics standards and frameworks has been devised and widely disseminated (e.g., Mathematics Framework, California

Department of Education, 1985, 1992), altering day-to-day practice remains the major challenge. In California, changes in classrooms have been slow, and what we now understand is that teachers must be extensively involved in building frameworks, curricula, and assessments in order to enhance their capacity to implement them. Without this commitment to staff development, the guidance offered in these frameworks will not be translated into practice (Cohen, et al, 1990). For teachers and school districts, assessment development projects represent substantial professional development opportunities. Assessment design activities contribute to the articulation of new ideas and standards forwarded in the frameworks, and increase teachers capacity to develop and use new instructional strategies.

Meaningful changes in local assessment strategies must occur concomitant with alterations in the pattern of classroom instruction. Changing the mosaic of mathematics instruction and assessment involves an ongoing commitment to a long-term program of staff development, communication, and collaboration. The meaning, validity, and impact of both instruction and the assessments that track its effects depend critically on the nature and quality of local support and professional development initiatives. The Mt. Diablo CBAAM represents an assessment development program in its fourth year, that relies on teachers to develop and implement an annual district-wide assessment. This presented a unique opportunity to study the impact of a well established performance-based assessment reform on the curriculum, the instruction, and the professional development culture in a district. The challenge for the district is twofold; creating new and challenging assessments while simultaneously altering the content and process of day-to-day instruction.

**The CBAAM Description**

The CBAAM is one of 29 pilot projects in the CAC. For four years, the CBAAM has been developed, administered, and scored by teachers. Approximately, 5,000 students in grades three and six are assessed annually. The CBAAM in an on-demand assessment comprised of three constructed-response items. Due to limitations in resources and a large sample of participating teachers, this research focused on the impact of the third grade assessment only.

**Purposes of the CBAAM.** When reviewing documents related to the CBAAM, four major purposes are identified by the school district (Nicoll et.al., 1994). The first involves an attempt by the district to bring their assessment system in line with current thinking on student assessment and to provide measures of "higher order expectations" that require students to generate rather than select answers. Students are asked to solve complex open-ended problems and then describe their approach in writing supported by the use of appropriate mathematical tools. The second purpose is to engage students and teachers in what may be their first attempt at an open-ended performance-based assessment. They intend this to be a positive experience; one that students and teachers can use to prepare for similar assessments in future years. Third, the CBAAM is designed to prepare students and teachers for similar problems on the California Learning Assessment System (CLAS) administered in grades 4 and 8. It encourages articulation of mathematics content and instructional strategies within and across grade levels by asking teachers to engage in the instruction that prepares students for the new expectations. CBAAM represents a formal occasion for teachers and students to engage in the requisite actions necessary for success on these new and different types of assessments. Finally, the CBAAM is one avenue for introducing parents to the ideas forwarded in the current mathematics reforms and the related assessment techniques.

**Problem Development.** Tasks for the 1994 CBAAM were developed by a committee of 12 third grade teachers and two central office staff. They began with the following guiding questions: 1) Can the child express mathematical thinking, ideas, and processes in written and pictorial form? 2) Does the child use a "reasonable" strategy to solve problems? and 3) Does the child apply concepts related to the unifying ideas (How many? How much? Finding, making and describing patterns, and representing quantities and shapes) to solve problems?

The committee generated a number of potential tasks, then field tested and refined the tasks during the fall of 1993. Three tasks were selected from a larger pool to appear on the assessment (These tasks and the student response form appear in Appendix A). On November 30 and December 1, 1993 third grade teachers participated in a three hour

in-service that reviewed the content of the CBAAM, administration procedures, and provided suggested classroom activities related to the content.

Administration and Scoring. The CBAAM was administered between January 10 and January 21, 1994. Teachers administered the assessment to their own students. According to teacher responses the assessment took between three and six hours of class time to complete. Teachers had administration guidelines that allowed for flexibility in student groupings and the time allowed to complete tasks. Basically, students were allowed as much time as they needed to complete the tasks. Tasks were initiated with group activities. However, each student produced individual responses to all tasks. In past years, the CBAAM was administered in the spring. The decision to go with a January administration was based on a teacher and district desire to receive the results earlier in order to use them in subsequent planning and instruction with the children.

The CBAAM is scored by Mt. Diablo teachers using six-point holistic rubrics. A team of third grade teachers and district staff refined the general CLAS rubric (See Appendix A) into a more detailed rubric for each of the CBAAM items. Teachers were paid a stipend to score papers and teachers from all grade levels participated. Teachers participated in a training session that instructed them on the scoring procedures and proper use of the rubrics. Scoring took place on two Saturdays; January 29 and February 5. All papers were double scored with the first rating recorded in "invisible ink." Papers with a score discrepancy of more than 1 point were moderated by an "experienced" teacher panel. The district estimates that less than 10% required moderation (Nicoll, 1994; personal communication). Following the ratings, papers were returned to individual teachers and students with double-rated item scores (e.g., 3/3, 4/5).

Reporting. Results are aggregated district-wide and published in a report to teachers and district staff (Nicoll et.al., 1994). Tables for each item (See Appendix A) illustrate the percentage of students scoring at each performance level (1-6). Samples of student work at three levels (2,4,6) are also included in the district publication. Score breakdowns by school or teacher are not published. Scores aggregated by teacher within school are only provided

upon request of the building principal. Historically, few principals have requested this information.

## III. Method

### Site Description

Mt. Diablo Unified School District is a large suburban district serving approximately 34,000 students in elementary, intermediate, and high school programs at over 40 building sites. In the past four years, the CBAAM has been administered in all third grade classrooms at 26 elementary schools. Each year, approximately 2,500 third grade students are administered the assessment by their classroom teachers. There are substantial variations in student populations at the school-sites as evidenced by poverty counts ranging from 1% to 70% and limited English proficiency (LEP) counts ranging from 0% to approximately 40%. Elementary school populations range from 450 to 850 with a typical building having three or four third-grade classrooms. The Mt. Diablo site and teachers participating in this research represent an opportunity sample through which to study the impact of a district developed assessment that has been in place for several years. All third grade teachers were asked to participate in the study.

### Research Sequence

The first stage of the research involved participation in assessment development meetings where items were refined and discussed and materials and communications for all teachers were prepared. This allowed for a review of materials, related publications, and procedures employed as part of the assessment program. Following the CBAAM administration and scoring, FWL constructed and disseminated a survey to all third grade teachers. The final stage involved individual interviews of a sample of teachers.

### Survey Procedure

Survey Development. The survey was developed to serve three purposes. The first involved obtaining background information about teaching experience, formal subject matter preparation in mathematics, related professional development and inservice preparation, and the level of involvement in the CBAAM development and implementation (See Appendix B for complete survey). This information served as the basis for group comparisons of the survey data. It was also used to select a target group for individual interviews.

The second and most vital component of the survey asked teachers to rate 58 items on: 1) the frequency with which students engaged in a variety of mathematics classroom experiences and were taught specific content linked to the CBAAM items (20 items); 2) teacher opinions about their own instruction, professional development and the CBAAM preparation (23 items); and 3) teacher use of classroom assessment strategies (15 items). Each item consisted of a statement followed by a five point Likert-type scale. The survey items were developed based on the content and instructional practices forwarded in the Mathematics Framework for California Public Schools (CDE, 1992), the 1989 NCTM Curriculum and Evaluation Standards For School Mathematics (NCTM, 1989), and a review of content and process requirements of the CBAAM items (e.g., group work, use of manipulatives, understanding coordinates and coordinate systems). A few items were included that were inconsistent with these guidance documents to serve as checks for positive response bias.

The third and final section of the survey consisted of an open-ended request for comments about the CBAAM and an invitation to participate in an individual follow-up interview. These teacher comments were valuable additions to the interview data because they included responses from teachers that were opposed to the CBAAM, but elected not to participate in an interview. The survey content was reviewed and edited by four CAC and FWL staff familiar with the CBAAM project and two Mt. Diablo staff responsible for coordinating the CBAAM development.

Survey Participants. Ninety teachers were included in the pool for the survey component. All regular third grade teachers assigned to self-contained classrooms were included. Specialists, Chapter 1 teachers, and special education teachers were not targeted in this study. Fifty-nine surveys were returned representing a 66% return rate. All teachers had experience teaching multiple subjects (reading, language arts, math, social sciences) in the elementary grades. Teacher experience ranged from two to 32 years with a mean of 16.1. Few teachers reported formal mathematics preparation beyond college algebra and mathematics/teaching methods courses. Most teachers reported professional development in mathematics education beyond teacher training or college programs. These included, subject matter projects, EQUALS-Lawrence Hall of Science, Marilyn Burns Math Solutions, and several local and regional mathematics inservice programs.

Survey Distribution. Surveys were produced by FWL and disseminated via the director of evaluation for the Mt. Diablo School District. Teacher surveys were sent to building principals with a cover letter describing their purpose and expected return date. Principals placed the surveys in teacher mailboxes at each school-site. Individual teacher survey packets included a cover letter to teachers, the survey document, and a stamped/self-addressed return envelope. The surveys were distributed during the first two weeks of February 1994, following administration of the CBAAM. Most were returned immediately, with a small number trailing-in through late March. Surveys were returned from at least 18 of the 26 schools. Many completed surveys were returned without teacher or school identification.

Survey Analysis. Of the 59 surveys returned, 10 were eliminated from the analysis due to large blocks of missing data. In some cases teachers did not fill out an entire section and in others they selectively answered a subset of questions. Surveys with only a few missing responses were retained in the analysis. In the analysis of individual items, data were omitted casewise. In the formation of scales missing data were imputed using item mean values.

From the 58 items five scales were formed representing; 1) general student instructional opportunities related to the 1992 Framework and the CBAAM (14 items); 2) content exposure linked to the 1994 CBAAM (6 items); 3) teacher actions and opinions that illustrate alignment with the 1992 Frameworks and the CBAAM (12 items); 4) a scale inquiring about opportunities, desires, and confidence with respect to one's current professional development in mathematics (9 items); and 5) classroom assessment practices (10 items). Seven items were not included in the scale analysis because they lacked clear content alignment with the five scales.

Two groups of teachers were identified from the surveys; those with no involvement in the CBAAM development or scoring, and those that participated in the 1993 or 1994 development or scoring activities. Independent t-tests were calculated to compare mean differences between the groups on each of the survey items and the five subscales.

**Interview Procedure**

**Interview Participants.** Twelve teachers were selected to participate in individual interviews. One dropped out in the final stages of the data collection and was not replaced. The primary criterion for selection was level of involvement in the CBAAM development process. Four selected teachers had no involvement with the CBAAM development, or scoring. A second group of four had experience scoring student work, but was not involved in any of the assessment development. The final group of three was involved in the CBAAM item development, piloting, and scoring. This stratification was important in order to obtain a cross-section of data from teachers with different levels of investment in the CBAAM. Interview participants represented seven schools. All teachers participated from one building (n=4). This provided a better opportunity to evaluate within and across grade-level impact at this site.

**Interview Procedure.** Individual interviews were scheduled in the late afternoons and conducted in classrooms at each participating teachers site. Interviews took between 60 and 120 minutes and teachers were paid a $40.00 stipend for their participation. The interviews were conducted between March 24 and April 20, 1994. The interviews were designed as an open discussion about teaching and assessment practices, the CBAAM, professional development and interaction with peers in mathematics, and state reforms including the frameworks and related assessments. The guiding questions presented in Appendix B served as a starting point for the discussions, but did not necessarily determine the topics or sequence of topics during the interviews. All interviews were audiotaped and transcribed. Third and sixth grade development committees were invited to a debriefing on June 2, 1994 where results of this research was presented and discussed with them.

**Interview Analysis.** The process of analyzing the teacher interview data involved the following steps: (1) transcription of the tapes, (2) identification of themes, (3) content analysis of the transcripts, and (4) cross-teacher analysis of comments within themes.

**Transcription of Tapes.** After the interviews were taped, verbatim transcriptions were completed for each teacher's interview. Transcribers signified unintelligible language by putting ambiguous words or phrases in parentheses. If the transcriber was entirely unable to

understand the teacher's or interviewer's words, then ellipses were inserted for unintelligible words and phrases. In these verbatim transcriptions a unique identification code was assigned to each teacher. Each teacher's comments were transcribed in their entirety.

**Identification of Themes.** Once the interviews were transcribed, they were read in their entirety by two researchers familiar with the study and the CBAAM. Upon reading each interview, the researchers replaced unintelligible words and phrases if they were certain of their interpretation. The researchers also corrected the spelling of misspelled words. For the final presentation in this report repetitions (e.g., I think...I think...I think) and unintelligible speech (e.g., ummm...y...y...aaaa...waa) were eliminated to enhance the readability of the discourse presented. Otherwise, the transcripts were not altered.

After all the transcripts had been read, the researchers identified common themes that teachers addressed during the interview process. For example, many teachers described the way they reordered their curriculum to prepare students for the CBAAM. Thus, "resequencing of content" was identified as an important theme. Another commonly voiced topic was teachers use of rubrics to articulate performance standards to their students. Thus, "use of rubrics" was also an identified theme. Each researcher identified the common themes independently and then discussed their lists. Based upon this discussion, the most central themes were identified.

**Content Analysis of the Transcripts.** Once the list of themes were identified, interview transcripts were coded. For each transcript, each instance of a theme was identified and designated with a unique code. During the analysis, the following themes were identified:

- the impact of the CBAAM on the content, sequence, and process of classroom instruction;
- teacher use of the CBAAM results;
- use of the CBAAM problems, rubrics, and results as a device to inform parents about the new mathematics program;
- use of rubrics as a device to articulate performance standards to students, teachers and parents;

- use/nonuse of standardized tests;
- professional development opportunities in mathematics;
- the California Mathematics Framework;
- articulation of the CBAAM: within grades; across grades; with the district curriculum; with the California Frameworks;
- fairness of the CBAAM, in particular non-standardized administration procedures, amount of classroom preparation, and teaching the specific content that will be assessed;
- what the CBAAM does and does not measure;
- problems with the CBAAM, including its developmental inappropriateness, heavy writing burden, and unclear directions.

**Analysis of Teacher Comments.** Teacher quotes were identified representing each of the above themes. Many of the themes were directly linked to the research questions, such as explanations of instructional modifications and discussions of instructional guidance. Much of the discourse on these topics was stimulated by the interview procedure. Other themes were indirectly related to the research questions and primarily teacher generated. Examples of these include, comparisons of the CBAAM and the MAT-6, and teacher concerns about procedural issues associated with the CBAAM. To facilitate the cross-case analysis, a catalog of quotes generated by all 11 teachers was compiled for each of the themes. The catalog was used to identify teacher perspectives on the themes listed. Many times teachers differed on a given issue; in these cases both sides of the issues are presented. The catalog of quotes was a comprehensive source recording each teacher's perspective on a given theme. Conclusions based on the interviews are provided in the Results section. Supporting quotes from the interview and survey data provide evidence for the conclusions drawn. This research focused on cross-case analyses of the themes. In no case do statements by a single teacher serve as evidence of a theme.

## IV. Survey Results and Discussion

**Individual Item Results**

Table 1 in this section presents the survey results for individual items. The first mean represents the performance of 20 teachers who were not involved in the CBAAM development or scoring. The second mean represents the performance of 29 teachers who were involved in the CBAAM development or scoring. The content of each item is presented with the corresponding group means and significance level if equal to or less than .05. There were significant group differences on 17 of the 58 individual items. For all 17 items the CBAAM involved group had higher mean values. This could be interpreted as a function of a systematic positive response bias for those teachers involved in the CBAAM project. However, on several survey items that were included to correspond to "traditional" instructional approaches, teachers who were involved less with the CBAAM rated higher. Examples of this include Items A6, A14, and B7. Significant differences on any of these items in favor of the CBAAM involved teachers would elevate concerns of a systematic positive response bias. Additionally, the majority of the CBAAM involved group voluntarily scored the assessments, but had not invested in the actual item development or field testing. Therefore, it is unlikely that their ratings indicate support for their own development efforts.

The CBAAM involved teachers reported more frequent instructional use of open-ended problems, investigations, cooperative working groups, and the use of literal and figurative tools to aid conceptual understanding. They placed greater value in the CBAAM initiative and the results obtained from the assessment. They also reported closer alignment between the CBAAM and their own instructional strategies, and indicated a greater desire for peer interaction and professional development in mathematics. Involved teachers also reported more frequent and varied use of alternative assessments. Significant differences between the item means in Section C of the survey were consistent with significant differences in Section A. Open-ended tasks, investigations, portfolios, projects, rubrics, and student self-assessment were used more frequently by teachers involved in the CBAAM. In general, involved teachers reported more movement in classroom activities and assessment practices consistent with changes suggested by the instructional guidance presented in Frameworks,

NCTM Standards, CLAS and the CBAAM. One interesting result occurred on items A11 and C10; "students use scoring rubrics or scoring criteria to evaluate their own work." Although, involved teachers reported significantly more use, both groups exhibited minimal use of these tools as instructional devices. It is not surprising to find infrequent rubric use in classrooms by teachers who report lower levels of open-ended/investigative task use and who are not involved in scoring student work on the district assessment. However, greater than monthly use of "rubrics" would be expected of teachers reporting regular classroom use of complex-format tasks, especially after participating in district activities that employ the use of rubrics to score work. Group differences on individual items revealed some interesting results, but the primary purpose of the survey was to evaluate group differences on clusters of related items, or scales.

**Scale Results**

The survey was composed of five subscales which were used to compare the two groups of teachers. Table 2 presents the five scales, internal consistency reliability, means, standard deviations, and significance levels from two-group comparisons. Based on self-report, teachers involved in the CBAAM engaged students more frequently in a variety of framework consistent activities, have stronger alignment in philosophy and teaching behaviors with the framework and new assessments, have greater interest and desire for professional development, and use alternative assessments more frequently. The most interesting two-group scale comparison arises from the fact that groups do not differ on the Content Exposure scale. When asked about frequency of teaching content directly related to three of the CBAAM items, both involved and non-involved teachers provided similar student opportunities. Students were generally provided "more than two lessons" on the content related to each item. Announcement of assessment content and the related teacher meetings apparently had the intended effect; regardless of their predisposition towards the CBAAM, or the type of instructional processes teachers reported, or their involvement in the CBAAM development and scoring, teachers specifically prepared students for the assessment.

This outcome is not unique, considering the body of research available that suggests teachers regularly engage in test preparation with their students (Moore, 1994). They do this for a number of reasons, including, insuring student exposure to content, test procedures, and test

format. They are also motivated by stakes connected to student performance, district demands to increase scores, personal demands to perform well in comparison to other teachers, and a genuine concern for their students. Elementary children are much more dependent on their teachers for knowledge exposure and guidance related to the actual assessment situation. This may stimulate teachers to provide much more direct support so that students are adequately prepared for the assessment situation.

Moore (1994) also found higher levels of content preparation relative to the process preparation. In Mt. Diablo, where teachers only had six weeks advance notice, it would be reasonable to interject a few specifically designed lessons or tasks focusing on the content of coordinate systems for example. It is another matter to fundamentally alter the patterns of instruction that evolve over many years. What the survey does establish is that there is a correlation between the CBAAM involvement and changing patterns of instruction. The data do not identify the CBAAM as the cause of that change. Two scenarios are likely; 1) teachers already making instructional/assessment changes volunteer to participate in the CBAAM activities, or 2) the CBAAM participation motivates changes in classroom assessment/instruction. In either case, the CBAAM involvement can be viewed as a process that facilitates that change process; either by recognizing, reinforcing and aligning with instructional changes in classrooms, or leveraging the change process by illustrating and communicating the content and process of desired modifications in mathematics instruction.

**Open-Ended Item Results**

Teacher comments on the open-ended survey question supported the premise that, regardless of teacher disposition toward the CBAAM, they prepared their students for the content on the assessment. The responses were quite diverse and either supported or refuted the validity and utility of the assessment in terms of the direct implications for instruction or the consequences of the information provided by the CBAAM. Consider the following extreme examples:

> The *CBAAM has been influential in my teaching - by the district instituting such a test it has made me aware that the district is serious about teaching problem solving and discrete mathematics in the classroom. It has been a wonderful tool for me to use to assess students' progress in*

*this area, and most importantly, my progress in teaching students. As a result of the CBAAM, parents are now starting to understand why there are less dittos and worksheets coming home; they are also beginning to see how they can better support their children.*

*The CBAAM was a horrifying experience in my classroom. We are required to give the test in January, a time when students and teachers are just beginning to get their feet wet. I do not teach fractions, geometry, or telling time until later in the year. With the CBAAM, however, I must change the timing of my curriculum presentation. Unfortunately, most third graders here at my school are not ready to take on fractions, geometry, etc...until later in the year. I spent several weeks preparing my students for the CBAAM. I feel they were robbed of the quality teaching time they could have received if the test were given later in the year.*

The polarity and diversity of the survey comments helped guide the interview discussions to focus on what specifically happens with teachers and students as a result of the CBAAM. Why does the same assessment, in the same schools, with similar groups of children, result in such radically different perceived outcomes? What mediates this? In the interviews, discussions centered on descriptions of teacher and student actions and behaviors directly linked to the CBAAM, use of the CBAAM information, use of the Frameworks, professional development experiences, and specific examples of classroom instruction. This helped to remove some of the emotional or philosophical flavor of comments that made it difficult to interpret the impact of the CBAAM on teaching and instruction for students.

**TABLE 1**

**Means, and two tailed significance levels for teachers that were involved, versus not involved in the CBAAM development or scoring.**

**A. Student Experiences**

**Please use the scale below to estimate the frequency of student participation in the following activities in your mathematics program.**

| Item | Not Involved $\bar{X}$ (n=20) | CBAAM Involved $\bar{X}$ (n=29) | Sig. |
|---|---|---|---|
| 1. Students write about their mathematical thinking to support and clarify their solutions. | 3.00 | 3.48 | ns |
| 2. Students work together on problems, sharing and discussing ideas, strategies, and solutions. | 3.50 | 4.14 | p<.05 |
| 3. Students use tools such as manipulatives, calculators, computers, and rulers. | 3.95 | 4.41 | p<.05 |
| 4. Problems and instructional activities require students to apply mathematical ideas to the world beyond the classroom. | 3.50 | 3.93 | ns |
| 5. Students use visual representations, computational algorithms, and models to to illustrate math thinking. | 2.55 | 3.76 | p<.01 |
| 6. Students work independently to complete problems focusing on mastery of specific computational skills. | 4.10 | 3.90 | ns |
| 7. Students are exposed to complex open-ended tasks that have multiple solutions. | 3.05 | 3.97 | p<.01 |
| 8. Students complete tasks that involve investigating mathematical ideas over extended periods of time. Problems and related activities may involve several class periods over several days. | 2.20 | 2.65 | ns |
| 9. Students reflect on their work (orally or in writing) to express new learning or understandings. | 3.40 | 3.58 | ns |
| 10. Homework involves formulating, completing, or revising open-ended tasks. | 2.40 | 2.52 | ns |

TABLE 1

Means, and two tailed significance levels for teachers that were involved, versus not involved in the CBAAM development or scoring.

A. Student Experiences Continued

**Please use the scale below to estimate the frequency of student participation in the following activities in your mathematics program.**

| Item | Not Involved $\bar{X}$ (n=20) | CBAAM Involved $\bar{X}$ (n=29) | Sig. |
|---|---|---|---|
| 11. Students use scoring rubrics or scoring criteria to evaluate their own work. | 1.15 | 1.93 | p<.01 |
| 12. Students revisit and revise their solutions/responses to open-ended problems. | 1.70 | 2.17 | ns |
| 13. Mathematics is integrated into instructional activities in other subject areas. | 3.30 | 3.62 | ns |
| 14. Homework involves problem sets that reinforce basic skills. | 3.65 | 3.59 | ns |
| 15. Students represent and compare quantities using manipulatives and visual representations. | 4.30 | 4.45 | ns |
| 16. Students collect, organize, and represent data in charts, tables or graphs. They write about their analysis and interpretation of data. | 4.05 | 4.31 | ns |
| 17. Classroom activities deal with understanding and using coordinates and coordinate systems. | 4.21 | 4.31 | ns |
| 18. Classroom activities focus on part-to-whole relationships and visual representations of fractions. | 3.90 | 4.00 | ns |
| 19. Students create and read maps (for example, they use directions, locate landmarks, estimate distance, and interpret legends.) | 4.40 | 4.52 | ns |
| 20. Students create and interpret schedules involving time and other dimensions. | 3.30 | 3.76 | ns |

**TABLE 1**

**Means, and two tailed significance levels for teachers that were involved, versus not involved in the CBAAM development or scoring.**

**B. Teacher Experiences/ Opinion**

**Please read the following statements and circle the response that best indicates your view.**

| Item | Not Involved $\bar{X}$ (n=20) | CBAAM Involved $\bar{X}$ (n=29) | Sig. |
|---|---|---|---|
| 1. It is important to meet with a group or team of teachers regularly to discuss mathematics content and instructional strategies. | 4.10 | 4.41 | ns |
| 2. I have altered the way students "do" mathematics to correspond to the 1992 Mathematics Framework. (For example, collaborative work, writing about math, and extended tasks or investigations). | 4.05 | 4.34 | ns |
| 3. I have ample opportunity to review and discuss examples of problems and student work related to the content and standards in the 1992 Mathematics Framework. | 2.65 | 2.86 | ns |
| 4. In the past two years, the district has provided professional development opportunities that enhanced my understanding and teaching of mathematics. | 2.95 | 3.10 | ns |
| 5. I have altered the content of my instructional units to correspond to content covered by the CBAAM. | 3.80 | 4.10 | ns |
| 6. There is adequate time to teach basic computational skills and more complex problem solving. | 2.75 | 2.79 | ns |
| 7. Textbooks are the primary source of instructional guidance and classroom activities. | 2.40 | 2.00 | ns |
| 8. In my class, I have altered the way students "do" mathematics to correspond to the tasks on the CBAAM. | 3.15 | 3.52 | ns |
| 9. Classroom activities are often based on the application of mathematics to real world situations. | 3.80 | 3.79 | ns |
| 10. I am confident in my ability to develop and use complex problems and investigations in my teaching. | 3.65 | 3.62 | ns |

**TABLE 1**

**Means, and two tailed significance levels for teachers that were involved, versus not involved in the CBAAM development or scoring.**

**B. Teacher Experiences/ Opinion Cont.**

| **Please read the following statements and circle the response that best indicates your view.** Item | Not Involved $\bar{X}$ (n=20) | CBAAM Involved $\bar{X}$ (n=29) | Sig. |
|---|---|---|---|
| 11. Teachers were clearly informed of the general content and format of tasks on the CBAAM. | 3.90 | 3.93 | ns |
| 12. I think recent changes in mathematics instruction and assessment are necessary and important. | 3.60 | 4.03 | ns |
| 13. I have altered the content of my instructional units to correspond to content described in the 1992 Mathematics Framework. | 3.60 | 4.00 | ns |
| 14. Feedback about student performance on the CBAAM will be valuable in my future instructional planning. | 3.30 | 3.93 | p<.05 |
| 15. Prior to CBAAM administration, I reviewed the generic scoring rubric with my students. | 2.60 | 3.03 | ns |
| 16. Tasks on the CBAAM mesh well with the type of problems students are exposed to in my math classes. | 2.65 | 3.31 | p<.05 |
| 17. In recent years, I have been involved in valuable professional development experiences (in math) outside of the district. | 2.45 | 3.27 | p<.05 |
| 18. Students will benefit by reviewing and understanding their performance on the CBAAM. | 3.25 | 3.82 | ns |
| 19. My students were well prepared for the content and task format on the CBAAM. | 3.05 | 3.14 | ns |
| 20. The time and effort spent developing and scoring the CBAAM is worthwhile in terms of the benefits to teachers and students. | 2.70 | 3.44 | p<.05 |
| 21. The district should only use assessment results to provide feedback to individual students and teachers. | 3.65 | 3.55 | ns |
| 22. Administration of the CBAAM and similar statewide assessments will motivate teachers to change instructional practices. | 3.15 | 3.69 | ns |
| 23. I would like to have more systematic interaction with other teachers that are developing and using alternative assessments. | 3.60 | 4.17 | ns |

TABLE 1

Means, and two tailed significance levels for teachers that were involved, versus not involved in the CBAAM development or scoring.

C. Classroom Assessment

**Please use the scale to indicate how often you use the assessment tools listed below.**

| Item | Not Involved $\bar{X}$ (n=20) | CBAAM Involved $\bar{X}$ (n=29) | Sig. |
|---|---|---|---|
| 1. Open-ended tasks | 3.39 | 4.07 | p<.01 |
| 2. Portfolio | 2.85 | 3.48 | p<.05 |
| 3. Textbook tests and quizzes | 2.95 | 3.27 | ns |
| 4. Teacher-made tests and quizzes | 2.50 | 2.58 | ns |
| 5. Developmental scales | 2.55 | 2.62 | ns |
| 6. Investigations | 3.05 | 3.55 | p<.05 |
| 7. Projects | 2.55 | 3.31 | p<.01 |
| 8. Exhibitions | 2.20 | 2.62 | ns |
| 9. Anecdotal records | 2.45 | 3.31 | p<.01 |
| 10. Holistic or analytic scoring rubrics | 1.95 | 2.65 | p<.05 |
| 11. Observational checklists | 2.95 | 3.20 | ns |
| 12. Student self-assessment or reflection | 2.65 | 3.31 | p<.05 |
| 13. Oral questions/interviews | 3.40 | 3.37 | ns |
| 14. Attitude surveys | 1.95 | 2.20 | ns |
| 15. Peer assessment | 2.10 | 2.83 | p<.05 |

**TABLE 2**

**Group means, standards deviations,**

**internal consistency reliability ($RXX^1$)**

**and two-tailed significance for scales constructed from survey items.**

| SCALE | Rxx' | Not Involved $\bar{X}$ | Not Involved SD | CBAAM Involved $\bar{X}$ | CBAAM Involved SD | Sig. |
|---|---|---|---|---|---|---|
| Student Experiences Reflecting Framework (14 items) | .80 | 38.05 | 6.64 | 44.69 | 7.80 | P<.01 |
| Content Exposure Related To CBAAM Questions (6 items) | .68 | 24.15 | 2.89 | 25.30 | 3.17 | ns |
| Teacher Alignment With Framework/CBAAM (12 items) | .81 | 40.45 | 5.63 | 45.03 | 6.55 | P=.01 |
| Professional Development Interest/Opportunities (9 items) | .75 | 28.90 | 5.49 | 32.62 | 4.18 | P=.01 |
| Assessment Activities (10 items) | .84 | 25.70 | 4.26 | 31.66 | 6.58 | P<.01 |

## V. Interview Results and Discussion

In this section, evidence related to the themes of the interview discourse is presented in clusters of teacher comments. This was done to illustrate to the reader the nature of the evidence bearing on the essence and magnitude of the effects characterized by each theme. Some effects are strong and supported by many diverse responses, while others are important, but not distributed across teachers. Occasionally, interviewer comments are included to provide context. In some cases, survey comments are included to buttress the arguments presented.

Teacher quotes are labeled throughout this section to indicate group assignment and individual teachers. For Example, E1 refers to teacher number one who had experience with the CBAAM development or scoring, while N11 refers to teacher number 11 who did not have experience with the CBAAM development or scoring process. Because different quotes from the same teachers are used throughout the discussion, labels E1, N11, etc...,identify all quotes arising from an individual teacher's protocol. A participant reference number above 11 (e.g., E14, N40) indicates the quote is from a survey comment.

### The CBAAM Impact on Third Grade Curriculum and Instruction

The interview data confirmed the survey results and indicated that teachers altered their instruction in specific ways in order to introduce content covered on the CBAAM. Because the CBAAM was moved from April to January, many teachers responded by resequencing existing units and content strands to provide student exposure prior to the mid-year assessment. Other teachers introduced new content that was not planned or included in their third grade program in prior years in order to accommodate the CBAAM content. All teachers reported some effort to introduce specific CBAAM content regardless of their level of participation in the CBAAM project. However, comments from teachers with experience in item development or scoring described smoother transitions when introducing new content and projected a stronger philosophical alignment with the changes. Alternately, the content transitions were more difficult for the less involved teachers and they often expressed frustration with the preparation and assessment process.

<u>Instructional Sequence.</u> Resequencing the third grade curriculum to prepare students for the assessment occurred in many ways. For example, typically teachers would have introduced

fractions, charting, and coordinates in the spring. For most teachers with or without the CBAAM experience, content that was normally introduced late in the second semester was interjected without apparent deleterious effect earlier in the academic year:

E1

*So...not that I was teaching to the test...but I realized that the things the test would be looking for in January was what I didn't usually get to until April...and so I had to redo my schedule. And also, my two colleagues said we need to move some of this stuff up front and do it early. Whereas, usually you do your basics the first part of the year. That (the CBAAM content) comes at the end of the year when you feel like they've...really done a good job...and actually though, by turning it around this year I don't feel that they are any worse off. In fact they may be better off. Because we did all of those things...the fun stuff...starting in September. And I kind of eased in the hard...dull things that would normally be first.*

E3

*In some cases I thought they would do a little bit better than they had done. Because I thought that by doing what I'm doing in the classroom and by preparing them with knowledge of the context that were going to be involved with in the CBAAM, this would give them a fair shot. And what it just showed me is that starting in September is not soon enough, so I was disappointed in how they had done, but it taught me.*

E4

*I think that it does reflect what we do in the third grade. I think it definitely does. Well it depends on...what time of the year you give the test. The fraction problem I am just going to get to fractions next, well within two week...I just sort of did some quickie lessons ahead of time to get them prepared for it. But I think if the test were given at the end of the year then all the kids would have done better on it. But that's just because I wouldn't get to fractions until later on in the year. I spend more time on multiplication and adding and subtracting.*

E5

*E5: Well for example on the grid question we hadn't done anything with grids so we just sort of pulled together third grade teachers and pulled out all the materials that we had about it, and then we did several different lessons on grids and how to read it and...say what the coordinates were and that kind of thing.*

*I: You wouldn't of done that otherwise if it wasn't on the CBAAM?*

*E5: No, that's right.*

*I: Would you of done it in the third grade at all?*

*E5: Yeah. There is some material we would of done. Although not necessarily at that time.*



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E6

*We were right in the middle of the Marilyn Burns multiplication unit when [a teacher] came back and said, "the CBAAM it's on coordinates." Oh my God we hadn't done any coordinates and we were really good at that (in past years). So I dropped everything and went into coordinates.*

E7

*I mean...we did do coordinates. The only...problem I ran into was that graphing is something I'm going to be doing but...I was sort of planning on doing it near the end of the year...And the CBAAM came sooner, so I wanted to give them some kind of an experience with it. So we did them earlier.*

Many of the teachers who had not been on development teams or scored student work in past years, presented varying levels of frustration related to resequencing their instruction. Their information about the assessment was primarily derived from the CBAAM teacher in-service in December, 1993. Had they known about the content at the beginning of the year (or earlier), the transitions might have been less cumbersome. As it was, they expressed a sense of being taken by surprise, but they were still compelled to make changes to provide students with pre-assessment opportunities.

N9

*Well because I think I had more time (in past years)...not necessarily to prepare children for the test. But more time to cover the material that was on the test. Fractions are okay...if you stick to halves, because children can understand that concept. But fractions for third graders don't come until springtime. Then you give it to them in January? You have to take everything out of sequence to get it in, to cover that material. I mean you had to push everything else back... Well a good third of the year is after the test. And fractions don't come until that part of the year.*

N10

*All of a sudden we had to step up what we were doing because we were not going to get into geometry that quickly.*

*I: You took some things you were doing and you just moved them up?*

*N10: That's exactly it.*

*I: Did that create...*

*N10: That didn't create any problems really, but I just thought well usually...getting into geometry and fractions comes later in the year and not in January.*

N16
*Although I consider my strategies current with the new framework, I did have to spend lots of time teaching ahead of where the students currently were developmentally, especially in the scheduling and coordinate plotting.*

N41
*We were told of the CBAAM (content) just before winter break. We started giving the test in January. We should have had much more time to prepare ourselves and our students. We need, during school time, to work on methods.*

N46
*In general, I like the move toward more cooperative learning and writing in mathematics. I question the objectivity in scoring these types of "tests" and the level of ability the "tests" require. I really had to drop everything and teach to the test.*

Instructional Content. In addition to resequencing existing content, teachers also described how they introduced new content that was not typically included in their third grade mathematics program. Generally, this was not consistent across teachers, but reflected a "filling in" of content individual teachers had not traditionally introduced. However, most teachers expressed that the carnival problem, which dealt with creating a time by activity schedule, was completely new content. A number of teachers also expressed reservations about introducing content that was too cognitively advanced for third graders or not a part of the explicit curriculum of the district.

N8
*I: When you received information about the items what exactly did you do?*

*N8: We went through examples of graphing...of mapping. They gave us some worksheets we talked about it, we played...those kind of games so they were familiar with the format. And they actually did better on that section of the test than I would have expected them to. I just, I felt that it...wasn't something that the third grade emphasizes, so the teaching that I was doing was taking time out from the things that I should of been covering.*

N9
*I: Do you think your introduction to schedules prior to the assessment were...some of their first experiences?*

*N9: Definitely...and we took schedules from the newspaper, and we took schedules from the television and movies, and things that they might be familiar with and...baseball schedules. But that was too broad a look. It was a look at too many different kinds of schedules which tended to confuse them.*

*I: If it's their first time...their first real opportunity.*

*N9: It was their first exposure. I think scheduling is beyond...the scope of what a third grader can do in January. It may be beyond the scope of what they can do in May. Because it just isn't in their frame of reference at all.*

E5

*E5: Now the carnival problem, that was a real problem because I don't think the average third grader can even read a schedule necessarily prepare one. I don't think they're even interested in schedules. Certainly, they wouldn't be interested in making up a schedule that they weren't required to. So what we did is...we took some schedules out of newspapers, well mostly the newspaper. We also found the TV Guide schedule...how do you tell when a program is on and what channel and that kind of thing?*

*I: Did they actually have to create one?*

*E5: Yes, I went through and created one with them. So we did it more or less as a class assignment because there wasn't time for that kind of thing. We brainstormed a field trip, and what would you need for the group.*

Teachers who did not alter content or instructional sequence were the exception. Several teacher comments from the surveys and interviews discussed "misalignment between third grade curriculum and the CBAAM items, but most described content changes in spite of this. Several teachers expressed frustration about significantly altering content to correspond to the CBAAM. Their statements reveal concerns about "teaching to the test." The description below characterizes one teacher's dilemma between following explicit district curriculum guidelines that do not address the CBAAM content and introducing the new content at the risk of not covering what appears in the guidelines.

N11

*The assessment is very poor at my grade level. It doesn't test what I'm told to teach. My math program is based on the third grade strands of achievement. The district tells me that my job is to teach, in math, these things (referring to a district mathematics curriculum guide).*

*I don't change my content to match the CBAAM because I feel strongly against doing that when its not the right content. I felt really strongly that with the CBAAM...to take time to...either cram or do a crash course when it wasn't a third grade expectation.*

*It's really frustrating to me when I try hard to cover the concepts at third grade level and then the test covers other topics. I'm left with two choices; 1) allow my students to honestly take the test and be unsuccessful and feel poorly because they haven't been taught, or 2) spend a week teaching to the test so that my students will be able to do it. This allows them to feel successful, but it makes the results meaningless and invalid. This year I chose number two.*

**Developmental Level of the CBAAM Items.** A more pervasive teacher concern related to CBAAM content involved the perceived developmental level of the items. Comments about specific items from both interview and survey protocols revealed that teachers, regardless of their experience or opinion of the CBAAM, questioned the cognitive complexity of items. This was especially true for the "Carnival" item requiring students to develop a schedule, and less so for the "Treasure Hunt" item involving coordinates and plotting.

E1
*I was not too happy with the "Carnival" item. I felt it was fourth grade level. Well they can't even read a T.V. guide, a T.V. schedule. It's very hard too for them to sit down and make a schedule. Now they live by schedules all the time. But they don't really know it in that frame, that term. I went back and I said okay, what time do you get up? What time do you eat breakfast? We went that route. But it was very hard to make the connection. And I find that the ones who did it had to have some very distinct guidelines to go by. I don't think they were developmentally ready.*

E3
*It involved so many different modes of thinking. They have the understanding of a schedule and I had thought I had given them a background. But then actually...a table and then having to think of three different factors at the same time. This would be something difficult for my husband to do.*

E4
*We gave it right after we got back [from winter break]. So we had a couple of weeks. And we did a lot of graphing activities and scheduling. But even with the scheduling activities...I did an activity where the kids had to do almost the exact same problem where I told them that we were going to have a party in the classroom, that we were to raise money, a similar kind of problem, and that the jobs would be greeting people at the door, passing out cookies and serving refreshments. And that they had to decide who was going to show up and all. I thought that was too little structure for the kids and it was really hard for them to grasp the concept. And most of them I'd say were able to do it after a couple of tries. I still don't really think that they understood. And when I was scoring the tests I could see that kids were just solving the problems the way that their teachers had taught them to. Just the same with my class.*

E5
*The scheduling was a lot harder. Because it's something they never...deal with. Well, your average third grader cannot tell time for one thing. So that's a problem.*

E7

*I think in general the teachers like the idea of this kind of a test, although I've heard complaints about certain problems that were on the CBAAM this year. Like the schedule for example. A lot of teachers just felt that it was too difficult. We do a lot of things with multiplying and subtracting, and we do a lot of writing on what subtraction is, and I guess we felt like the schedule was something that was just so open-ended it was tough for the kids.*

E20

*I was very pleased with the test this year. However my students had difficulty creating a schedule because in their lives they have never had to make a schedule, only read them.*

Based on the analysis of teacher comments, criticism from the CBAAM involved teachers tended to be less intense than those not involved in development and scoring activities. However, affect aside, most teachers questioned the complexity of the "Carnival" item in particular, but still altered their instruction in order to prepare students for the CBAAM content.

N8

*That's my real criticism. It's not the philosophy behind it, it's the choice of items. I think that the CBAAM didn't measure what the kids could show in...graphing. And graphing is something that we cover. The scheduling item I think is outside of the third grade curriculum. It dealt with time, it dealt with time over the twelve o'clock hour. Which is a...fairly sophisticated concept for some of the children. It wasn't just measuring just a four hour time span, you had to go from ten to twelve, and twelve to two, and realize you know what that time was. I'm not sure that these children would be expected to make up a schedule for a booth for four periods. I don't think that was a real world application for them. I think there were too many variables for them to deal with. The "Hershey Bar" one I think was a good example of something that fits into the curriculum. Something the children didn't have a problem with. Something that they could handle and explain very well. The other two I found I had to do a lot of pre-teaching to get them ready to even take test.*

N9

*N9: The weakest area for my class was the "Carnival." And we had talked about schedules and things like that.*

*I: Why do you think it was so hard for them?*

*N9: I think that particular concept is beyond the third grade. I don't think kids have...practical exposure...with a T.V. guide even. Mom and Dad read it, and then the kids get it as far as the schedule is concerned. A movie schedule,...a bus schedule. Third graders don't read it themselves. They're not exposed to...the making of the schedule.*



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N10

*I think overwhelming...first of all they had to figure out a schedule and that's very difficult for third grade kids, because future time is like from now until lunchtime, and to logically figure out how they're going to staff the different jobs at the carnival and to justify it? You know they were keeping so many different variables in their head, it was very difficult for them. Developmentally very inappropriate, especially the item that dealt with...the "Carnival" and the scheduling.*

N12

*The items on this year's CBAAM were developmentally, totally inappropriate. According to research, the items, especially the "Carnival" scheduling were seventh grade. The scoring rubric will be meaningless because the items were so far off what eight year olds can cognitively do.*

Many teachers blended the idea of developmental inappropriateness with the assessment being inconsistent with district curriculum guidelines and the historical sequence of content coverage in the third grade. This could be interpreted as resistance to change or a lack of philosophical alignment with the assessment. However, the teachers were confronted with many simultaneous changes. New content had to be introduced in a new sequence, and for many they had little time to prepare for these changes. In addition, many third grade students had truly not mastered concepts or skills tapped by the assessment.

E5

*The test items were developmentally inappropriate. Coordinate geometry is not part of the third grade curriculum. Fractions are only part of the end of the third grade curriculum, and we gave the test in January. Scheduling is totally inappropriate, one half of the third grade children cannot tell time - let alone figure out how to cross the 12:00 hour. They are not interested and do not deal with them (schedules).*

N36

*The assessment uses practical knowledge and organizational skills. They expect every child has had practical experience in making a schedule or planning a route or dividing fractional numbers. They need these experiences, but seldom are ready for the CBAAM assessments unless preteaching is done. Third grade is an eight or nine year old, not an 11 or 12 year old child. Given the same test to fifth grade students, our results would not be from a teacher taught assessment, as I feel we are doing with third graders.*

The above examples point to problems related to student development and mastery of concepts (i.e., telling time) related to the CBAAM items. They also illustrate an assumption that developmental readiness is correlated with curriculum sequence. In this situation, if all

the children were developmentally ready for the items, they still had a limited window of *opportunity to experience* the content. Teachers took advantage of that window, but often found it was too limited an opportunity for their students. Consider the "Treasure Hunt" (see Appendix A) as one example. In reality, children can begin learning about spatial relationships through organized two dimensional grids (geoboards) as early as kindergarten. In subsequent grades, they can develop locating and mapping skills by learning direction, distance, and by visualizing location using coordinate grids. It is these multiple opportunities and experiences over time that build a child's mastery of these concepts; not the introduction of a single unit in the third grade. The assumption that these skills are taught and learned in only the third grade would wreak havoc with most third grade mathematics programs. The introduction of special units and subsequently the CBAAM assessment should be viewed as the next step in the teaching/learning process and not the final evaluation based on one limited exposure.

All teachers interviewed reported their efforts to cover the content being assessed by the CBAAM items prior to the assessment. As part of their preparation they reordered content, and added new content. Teachers also stressed instructional processes that support the California Mathematics Framework and the NCTM Standards. By working hard to prepare students for the test they increased students' opportunities to learn the mathematics content, and to participate in extended investigations that represent complex problem-solving situations. As they prepared for the CBAAM, students had more opportunities to work in cooperative groups, use manipulatives and engage in hands-on math activities. Students were also asked by teachers to be more explicit about how they solved mathematics problems.

**Instructional Processes.** Although teachers reported substantial changes in their instructional sequence and content, most teachers, in preparing for the CBAAM, did not have to step outside of established teaching methods and strategies. When preparing for the CBAAM, they did not significantly alter the process of instruction. They used; open-ended questions and investigations, cooperative learning groups, manipulatives and extended oral and written responses to questions. Teachers reported that most of these strategies had been in their instructional repertoire for some time and provided many examples of how they were used

in the classroom. In this context, it appears that a major conflict presented by the CBAAM centered on the appropriate use of pedagogical strategies in conjuction with specific, and in many cases, unfamiliar content. Many teachers talked generally about the alignment of the CBAAM with their instructional process, while others made specific references to problem solving, manipulatives, etc.. In addition, many teachers perceived that the types of items used on the CBAAM increased student involvement and satisfaction when doing mathematics.

E2
*I: You said your students did well on the CBAAM and you attribute that to a lot of experience?*

*E2: A lot of experience and experiencing success, and realizing that not getting it or making a mistake isn't what it's about. It's the process. I teach process a lot. It's not winning, it's not getting it right, it's understanding. So I'm going for understanding all the time. You know, I'm constantly saying that I want to be sure that everyone understands. And they know. They aren't afraid to say they don't understand...because that's a natural place to be. The next step is to create the understanding. No one can learn including me...if you don't understand what to do, or if you don't understand what it's all about. So the big thing to do is ask questions and find out.*

E7
*I think it's [the CBAAM] improving the math instruction. Teachers are moving more away from just having kids memorize or just learn how to do computation, to teaching kids to problem solve. The fact that it's on the test is motivating us to learn to have our kids...teach our kids to do better on the test. But also, in the process realizing it's more fun for us to teach the way that the CBAAM is structured. I enjoy teaching math through the CBAAM much more than I enjoy it for the MAT-6 for example.*

N9
*Several years ago I started using Marilyn Burns and problem-solving with manipulatives...prior to the CBAAM. So I was certainly in favor of the CBAAM because it did test much more closely to the curriculum that I was teaching. Well certainly the writing portion. How they solve the problem. We do a whole lot of that with my Marilyn Burns [Math Solutions] problem-solving, what they did and what they learned, and the step-by-step process that they went through. That lines up a lot. The availability of manipulatives. For example in the brownie problem. But the use of manipulatives to solve the problems...yeah.*

N10
*I've been doing this...for a long time. And I'm just thrilled that finally we have...a testing vehicle that is closer to what we're really doing....or some of us*

*are really doing in the classroom, and I think we should all be doing it. I just love it.*

*I got rid of my textbooks three years ago, four years ago...I forget. I just started going with the Marilyn Burns Math Solutions. So I think...the new tool (the CBAAM) is more in line with what I am doing in class.*

Extended Investigations. Several teachers reported that they selected mathematical problems that required several days of activity to complete in preparation for the assessment. These extended investigations involved solving a real-life problem that requires completion of a number of steps en route to solution. This involved the application of mathematical operations, problem solving approaches, and writing about and discussing mathematical thinking.

E3
*E3: It gave the children the opportunity to show their ability to explain their thinking and explain the process they went through to solve the problem.*

*I: Do you do that in your class on a regular basis?*

*E3: Yes, I would say once a week. Should be more than that, but at this point that's where I am.*

*I: Is that part of what you would traditionally do in the third grade?*

*E3: I emphasized it more.*

E5
*Well, I think it [the CBAAM] very much effects instruction in that we want the kids to do well on the test, or I at least do. And you know unless they've had this kind of problem-solving sort of...situation or...practice they're not going to do as well as if they haven't.*

E25
*I think the CBAAM is opening the door to more investigative approaches to mathematics instruction. In grading the tests it's obvious that different people approach the test in various ways; some teach to the test, others help very little. We need to emphasize the understanding in math - not just the rote skills.*

N8
*I: What part of your math instruction lines up with the CBAAM?*

*N8: The idea that you do a math exploration and then you write about what you've done. You talk with your partner about what things*

*you've discovered and look for patterns and things. Tying it to real world application also.*

Cooperative Learning Strategies. Teachers have been using cooperative learning strategies as part of classroom instruction for years. The use of cooperative learning activities as part of an assessment process is a dramatically different approach than the use of traditional, standardized testing procedures. When traditional standardized testing is conducted, students work alone to solve multiple choice items and record their answers by filling in a bubble. Third grade students in Mt. Diablo classrooms are experienced participants in group activities. All the CBAAM problems were constructed to include group activities. Thus, teachers were encouraged by the nature of the CBAAM items to continue using cooperative groups.

E2
*Well if you want to talk in teaching styles...it used to be the old lecture. I never really was satisfied that way. I guess that's because I've been basically at the Elementary level. I don't believe in it. But now...we have individual projects, we work as partners, and we work in teams, cooperative learning. So that encompasses a lot of different learning styles for kids in which it's very helpful for them and it helps to prepare them for the future. But getting down to the basics of the CBAAM, it's hands on. It's....problem-solving, it's critical thinking. I like kids to think. I like to get kids thinking. Kids love it. They love it much more than...the person who stands and lectures in front of the room and does drill and all...or even story problems out of a book.*

E6
*I: Were the CBAAM items similar to the kind of things you do in class?*

*E6: Yes, the scheduling not so much..., working with partners, working in cooperative groups...all that...yes.*

Use of Manipulatives. The use of manipulatives and hands-on instructional activities is regarded as an efficacious approach to mathematics and science instruction (NCTM, 1989; CDE, 1992). In the course of day-to-day instruction, Mt. Diablo third graders have access to many types of manipulatives (cuisinaire rods, counters, geoboards, physical models, etc). Many teachers reported that they relied much less on textbooks and some reported that they no longer used texts at all. In preparation for, and during the CBAAM assessment, students were also able to retrieve manipulatives as problem-solving aids although they were not provided by the district.

E5
*E5: Certainly the writing which is related to the math and certainly the manipulatives, although you know it really galls me that they don't give you any manipulatives to do the test. They just give you paper and pencil.*

*I: Do your kids get a lot of experience working with this in class?*

*E5: Yes. About three times a week.*

E6
*I think we are now teaching in a different way. We are using a lot of manipulatives. We do very little...just straight calculation.*

Writing Down Important Ideas. Many teachers encouraged students to give extended oral and written responses during instruction. However, several other teachers reported that their students received lower scores on the CBAAM because they failed to provide sufficient detail to obtain a higher score. Some of these teachers attributed this to unclear administration procedures, while others suggested that students have not been taught, historically, to be thorough in their written explanations on assessments. Teachers also reported that in preparing for the assessment they chose activities that involved writing down the steps that a student uses to generate an answer. In addition, teachers frequently prompted students to write more as they examined student work during instruction. In general, teachers indicated that students knew what to expect in terms of the writing demands of the assessment.

E7
*When the kids were given a task and asked to do some writing about it...my kids didn't look at me like...what do you mean? They know how to write about math or write about how to solve a problem. So they knew what I was talking about, they weren't completely mystified when they saw the test. Because we had done a lot of problems where they had to...you know similar problems like that where they had to explain what their thinking was. My kids didn't actually do all that well on it but they didn't panic from it so I guess I made them feel more comfortable when they saw the test it wasn't like something they hadn't seen before. So I think that emotionally they didn't feel distressed by the test at all.*

E19
*I think the CBAAM gets better each year. The questions are getting clearer and students are better prepared for this type of testing. Writing in math has become an integral part of our math program and this has helped students approach these tasks with a positive attitude. My students liked the assessment and this impressed me on the need for more good open-ended questions. A resource of good questions would be such a help as we know they are difficult to formulate.*

Increased Writing Burden. However, teachers were also concerned about the impact of the increased writing burden for students with poor English language skills and learning handicaps. In many cases teachers assisted these students by reading problems aloud and transcribing oral comments into written responses using "proxies". Teachers were in agreement that the CBAAM gives these students opportunities to perform on the problems, but that it is not a very good indicator of the students' mathematical capabilities. A few teachers were concerned about the writing burden, in general, and the stress that it places on the expression of mathematical ideas.

> E3
> *What I have a problem with the CBAAM and with the CLAS test is...it's children of limited English proficiency and children who have special needs in regards to literacy. It doesn't tell you much at all.*
>
> E6
> *The thing that I didn't do that I would probably do next time is take more dictation. I just let them (ESL students) work their way through it and they used invented spelling. A lot of them have their initial consonants down so they will write that then put in a dash. So I would probably do more of that to make sure I have a good understanding of what it is they are trying to write. I sat down with four kids and asked what's this? And what's that? And tried to fill in the words for them. It's not a test of writing, it's a test of understanding.*
>
> N28
> *Take the letter writing, to anyone out of the test having students write a letter puts a whole different [level of] stress on the thought process assessed by the test. Just ask students to write!*

Close Alignment with Philosophy Advanced in New Mathematics Instruction. In addition to corresponding with new instructional strategies employed by teachers, many teachers described a relationship between the CBAAM and the "new" mathematics philosophy. In this light, cognitive psychological findings and constructivist philosophy have altered the way educators regard student learning. Increasingly, educators regard learning as an active process whereby students build knowledge structures based on networks of facts, principles, beliefs, and procedures. The construction of new knowledge requires sustained exposure to new content. Many opportunities to interact with the content through interactions with the teacher, other students, written materials, and manipulatives all contribute to the establishment of a rich database of information that a student can access when solving problems. The CBAAM items encouraged the use of instructional processes that help

students' construct knowledge that can be related and applied to their daily life. The emphasis on written expression helps establish links among the facts, principles and operational procedures that students must integrate in solving complex mathematical problems. Therefore, the assessment may serve an important communicative function; one that conveys the nature of important mathematical learning.

E1
*It (the CBAAM) comes from the concept end of teaching...away from the computation end. However, I don't want to throw out the computation and the drill because there's some youngsters that learn the other way. They have to have a pattern to follow. So I think we still need the patterns, but it comes farther down the line after they understand, oh this is division. Then you say okay this is what the pattern looks like, and if you follow this it will work. That's the approach I've used. Now I know I'm still putting some of the old view in with the new. But I really couldn't throw the baby out with the bath water.*

E3
*The district is very serious that we teach this way...and so that's a pretty powerful message they're giving with this kind of a test. So, with that in mind, that helped me understand, what we should be giving these children to do.*

E4
*It does show...and I even heard some of those kids complaining to other kids, well it's not fair that you guys get to do this and...what you're learning is fun...Making comments like that. And so...it makes a difference because the more positive experiences that kids have...in learning, and the more cooperative..., the more the teacher knows about teaching skills and learning techniques, and the more the teacher is willing to put in time and energy, I think the better the kids will do because they're just going to have a better education. They're going to be a step up. And I also think that if the kids had a lot of experiences that were similar to what was going to be on the assessments...they're definitely going to do better on them.*

E7
*I think it certainly gives...teachers an idea about what kind of problems kids should be able to solve...or the kind of problems kids should start to think about...Teaching them to solve problems in groups. I think it's helping them be more organized in how they explain things, how they present things, and so I think they're just able to organize a paper better or organize their thoughts.*

*I: But how is the CBAAM doing that?*

*E7: Well...just the fact that the problems are on the CBAAM, so we're doing more problems in the classroom.*

N10

*It assesses...first of all can they solve a problem? Can they organize the information? Can they explain in writing, in a clear logical way to justify what they have done to get...to solve the problem. It helps teachers because it shows them what the curriculum is supposed to look like. And you can't hide behind your textbook anymore. It's just not going to cut it.*

**Teachers Use of the CBAAM Results**

This section describes how the teachers used the results of the CBAAM. It was clear from the survey comments that some teachers, especially those opposed to the assessment, had no intention of using the information from the CBAAM. As the preceding sections indicate, the assessment takes considerable time and effort to prepare for, administer, and score. If information is valued and used to enhance teacher and student capacity to engage in challenging mathematical endeavors and enhance instructional opportunities, then the program may be worth the effort. If, on the other hand, information is not valued or used by the CBAAM participants, the benefits of the reform are limited to increased student opportunity before and during the assessment, but not subsequent to the assessment. Furthermore, written district guidance and workshops led by teacher development teams encouraged teachers and gave specific examples on how to use results to improve student performance and instructional programs. Nine of 11 teachers interviewed described a specific teacher or student use of results.

Whole Class Instruction. According to teachers there was little consistency in the way that results were disseminated among teachers at the school-site. Teacher use was independent, without much collaboration across classrooms within a school or much direction or personal interaction on how to interpret or use the results. As such, results were used primarily to alter instruction within classrooms. However, a few teachers used the results to communicate with other teachers or parents. Teachers' enthusiasm for using the CBAAM results was mixed. Teachers who reported using the results, altered their group instruction and reflected on their own teaching based on their whole class' performance rather than using the CBAAM for purposes of individual diagnosis or student placement. Teacher use of the CBAAM results was consistent with the intended purpose of the assessment; the information was used primarily in classrooms as an instructional tool.

E3

*I, first of all, use it in my teaching as a tool to let me know how I'm doing. Where you know looking at these kids...where are they? Where do I take them from here? Where do the majority of the children score? What part of it were they lacking? You know, maybe they were able to come up with the right answer, but they weren't able to express it well.*

E7

*Well, I looked at those (the CBAAM) in terms of how the kids did on the writing part of it. And so on the report card, there's a section that says math and writing. And so I used...that a little bit to...determine how the kids were doing in writing. Of course I had a lot of other examples...not just the CBAAM.*

N10

*What we have is a traveling portfolio that...we have pieces of writing in there in literature, and...the third grade has decided we're going put our CBAAM results in there. So the fourth grade teachers, some of them will understand where the children finished...at the end of the year so they can look at what they did in third grade and take it from there into fourth grade.*

Articulating Performance Standards Via Rubrics. Many teachers employed the scoring rubrics as an instructional device to articulate performance standards during whole- class and small group activities. This was probably the most formal use of results and was outlined in written documents and at teacher workshops prior to the assessment. A few teachers indicated that the CBAAM and CLAS type rubrics have been integrated into daily activities for students. Teachers frequently reported the value of presenting the rubric to provide concrete examples to students of the types of responses that would receive a six versus a one. Some teachers reported using the CBAAM rubric to review student performance on the assessment. Other teachers suggested using the rubrics to explain student performance to parents when they visit the school.

**E4**

*First, I went over it with them as a class, and I did it during early bird and late bird reading when I had the kids. I explained the rubric to them, and gave them examples of each one. And I told them...I gave them the percentage at each level...I would say out of a hundred kids this is how many kids got a four. Then we drew a graph so that they could see that. When they got their test back and they got a three, they could see that almost everybody else got a three too. Most of them were really happy about that. I think that really answered a lot of their questions about...how come I didn't get a six? So...that was helpful...last year I don't think we got that if I remember correctly...how many kids scored at each level.*

E5
*I: How did you use the CBAAM results?*

*E5: I passed out the test booklets and...I gave them the...what's it called?...the rubric for each problem. Then we talked about that, and of course this was over several days.*

*I: So you went through each problem with the whole class using the rubric.*

*E5: Exactly.*

*I: Did you introduce the rubric earlier in the year?*

*E5: No. Just as a result of this test and then giving some practice writing...things that follow the same kind of things. So that's why I have this rubric, this particular one sitting here, so we went over that.*

E7
*Okay first I put it on the overhead...I made a simplified rubric...I didn't copy the one that was in the booklet because that's real complex. I made a simplified rubric the kids would understand, a couple words for each one. I explained what the rubric meant. I passed back ...one at a time, or one booklet at a time. I had them look at their score and find out what their score meant. And then I put up an example of a six. What a six would look like for the "Hershey Bar" problem, and we went over it and talked about why it would be a six. And then I had the kids take a blank piece of paper and they practiced doing a six. Which they actually even had trouble with because some of them maybe if they didn't understand in the first place had trouble, so they just kind of copied what was on the overhead. So I did have them physically say...you know I said to them, now if you could do the test over and get a better grade, what would you do to make your answer more clear? And so they all went through that. The other two I passed back and I explained the...let them look at their...look at their score. At that point I did more modeling with the kids, where sometimes I feel like when I would...we would do an open-ended problem I'd correct it. But a lot of times I wouldn't go back and have closure and say to the kids, okay now you know this is what a...maybe this is what a real good one would be or something.*

N8
*I: Was that a result of the CBAAM experience?*

*N8: The CBAAM and the CLAS both...I decided that it's helpful for children to know what they're working towards. I also ordered the materials that were suggested in the CLAS manual. They're open-ended questions and I use those as homework...activity once a week. And it gives a little checklist at the top for them to...to kind of...it's a rubric type of thing to make that used pictures and drawings and given the multiple answers...there are those reminders. So they're getting familiar with that. We use a writing rubric also...in written work. One*

*of the teachers has just developed a science rubric...and some consistency in the form so that when you go from one...curriculum area to another...there's a slightly different rubric but it still has the same basic points to it.*

*I: Are the kids adapting. Do they use them pretty well?*

*N8: I think they like knowing. You know they can go back and look and say oh gosh I forgot to organize my work. Maybe I'll do this over again.*

N9
*I shared the results with them and we have since made up our own little math rubric that they use in their notebooks...for grading purposes. It's only a four point rubric, but that's fine. Except for the "Carnival", we really looked at basically here's what the sixes were. You know here is the best anybody could do. I shared that schedule with them, and we talked about what it was that we attempted to do, and what the six was—they made it you know. Actually the six was a lot cleaner and easier than what they had tried to do. They just tried to do too many things.*

N10
*N10: Well, there's good and bad to that because what I've done is to xerox off a copy of...what a...I think there weren't even that many sixes. The children compared what they had done against the exemplar. And then, we discussed well how we can improve. Their job was to take one of the problems and to see if they could improve it...to come up one...and most of them did.*

*I: Were you happy with that?*

*N10: I think if you use it as a valuable learning tool to take a look at where you are...the student is going to be able to do it...self-evaluate...then it's valuable.*

*I: It lent itself to that?*

*N10: Oh yeah, but all of their...writing and rewriting lends itself to that. We do it in science, we do it in math...we do it in...language arts.*

<u>Motivating Students to Improve Writing.</u> Some teachers used the CBAAM and the rubrics as a springboard to motivate students to improve their writing. The rubrics gave students an opportunity to see the amount of detail and quality of writing required for a high score.

E6
*I know it's [the CBAAM] changing the way...not so much the wayI'm teaching because I've always used a lot of manipulatives and things like that...but in writing and explaining...we need to keep looking at that. Explaining themselves in writing...explaining their thinking and how they're thinking. They're not very good at that and they haven't had to do it until the third grade. I expect it all the time. We write about math everyday.*

N8

*That's the way...they see themselves. Anything less than a six is devastating and to get a three instead of a five...was hard. In fact, I gave them a chance to go back and rewrite anyone of the items that they wanted. I said take this as a sample and now let's see if you can do a better job. I gave back their tests. I explained to them how they were scored, what the numbers meant. And just in general terms that if you got a four, five or six you did well, and if you got a three or lower then you need to make sure that you write it so that somebody who's reading it...I didn't want them to think that they had failed, but that they had failed to write down everything that they knew.*

**Communicating Standards and New Instructional Approaches to Parents.** Some teachers described plans to use the CBAAM results to communicate the nature of the new mathematics instruction to parents. The types of items used on the CBAAM , as well as the scoring rubric, would give parents a clear example of what their children were expected to demonstrate in contemporary mathematics classes. Teachers reported that parents still expected their children to bring home computation worksheets. When parents get exposed to the actual CBAAM items they are better able to understand the types of instruction and homework to which students are exposed. However, in many cases teachers indicated that schools haven't done the necessary ground work with parents during this transitional period.

E1

*When you explained what the grade meant...if the teacher was happy with it...and I let them know that I was...they were fine. And I didn't have one bad comment from a parent.*

E2

*That's another thing that I've been working with the Principal on. Suggesting that what we need to do is...to provide education for our parents. Now this year we only had twenty minutes...for back to school night, and you know, I like to talk an hour and a half...I have a very involved program. So I suggest that we go back...take the parents through some of these experiences, have them do it so they can understand what's going on and how it applies.*

E3

*I just think that's another way that the district's going in the right direction. When parents start seeing that tests are being given this way they are much more open to the idea that there aren't as many worksheets coming home.*

*And also...you're playing a lot of games and my kids don't know the math facts. You get questions in those regards and when they see a test like this then they can begin to understand.*

N10

*The kind of person that works here, first of all is very dedicated and very innovative. We are interested in doing the best job with the curriculum that we can based upon research, and to evaluate what we're doing. Then see if it works, and then reevaluate, and go forward and see if that works. The mistake we made is that because we were still...forming...the concept of the portfolio and the rubrics and everything, we did not include enough of the community in the education process. So you know a lot of parents said well what does this mean? So we know now I think for next fall, this coming fall '94, that we need to have a specific night where we will have the exemplars out and educate parents...so that they understand what a six is. What does that mean? What does that entail?*

A few teachers purposefully avoided active use of the CBAAM results with their students or sharing results with parents because of concerns over the effects of what they perceived to be low scores, on student motivation. In one case, the teacher selectively reviewed items with students (reviewed "Hershey Bar", but not "Carnival"), while another teacher gave no feedback on individual student scores. These teachers indicated that students worked hard on the assessment items and would likely be discouraged with the results.

**Contrast of Traditional Tests and the CBAAM**

**Emergence of the MAT-6 Theme.** During the interviews, many teachers from both involved and non-involved groups commented on their dislike of the MAT-6 test, both its format and content. This was not a topic generated by the interviewer, but usually came up during the discussion of the CBAAM alignment with instruction or use of test results. In many cases it arose as a contrast to the CBAAM design and subsequent teacher use. In others the interviews took place near the MAT-6 testing dates and arose when discussing current activities. At that point the interviewer began to probe whether there were specific uses for the MAT-6 results. Only two teachers reported use of MAT-6 results. After probing about possible uses the teachers began to explain why they failed to use the MAT-6 results.

E4

*I: You mentioned the MAT-6 results. What do you do with them when you get them back?*

*E4: Well, I stick them in the cumulative files and I send the results home to the parents. And I worry about some kids that have really low scores.*

*I: Do you do anything with the scores and then make changes or...?*

*E4: No. And I think that the actual test is upsetting for a lot of the kids...they're not used to working that way for one. Tomorrow we're taking the practice test and I'm going to get them ready. And tell me, we're not going to be working together, we're not going to be asking questions of each other. And I'm going to do it during my reading period because I feel that...that way I can at least give them some peace and quiet. And they all don't all have to sit next to one another.*

*I: It's quite a bit different than the CBAAM.*

*E4: They really enjoyed the CBAAM. Most of them are not going to enjoy the MAT-6. There's a different kind of pressure. It's a test. It's not an assessment as far as they're concerned. It's a test. It goes in their file and people look at their scores. And they're eligible for certain things according to their scores.*

E5
*E5: Not really because especially the MAT-6 is so far out of kilter as far as what we are doing now in the classroom.*

*I: It is?*

*E5: Yeah, it really is.*

*I: In what respect?*

*E5: Well it's still basically paper and pencil math, and what do you understand about this problem? Or...what is 300 + 25? What is 300 + 20 + 5, and...those kind of things we don't do much anymore.*

*I: Do you think the CBAAM and the MAT-6 together would give you good information?*

*E5: Definitely. I mean certainly the CBAAM is a lot more curriculum-based or more relevant to our curriculum today and the State Framework and so forth. Although I think there is still a place for the MAT-6 even though it's pretty much out of date...curriculum wise. There's still a place for it I think in that it gives you a more detailed idea of where the children are now, and what maybe they don't know in specific skill areas.*

E6
*E6: They don't do very well on the MAT-6. They don't perform anywhere near as well as they do on the CBAAM. We end up being down in the 23rd percentile on a lot of those.*

*I: Why do you think that is?*

*E6: Because I think we are teaching in a different way. We are using a lot of manipulatives. We do...very little, just straight calculations. And...their math is their best. I mean generally they are more competitive in math than anything else. More than reading or anything like that.*

*I: What do you do with your MAT-6 results when you get them back?*

*E6: Trash them. I don't think they're valid. I don't think they're that representative of what the kids are doing. I think the CBAAM is much more representative of what they're doing. If I want to talk to a parent, I have to say your kids in the 23rd percentile and you know that means...76% of kids scored higher than they did. But if I can say they have the computation for the multiplication, but they don't exactly understand the concept of it..., they need to have a better picture of what their kids look like. The parents will work on that, but it's different than what the parents are used to.*

N9

*N9: I'm definitely in favor of the CBAAM as opposed to I just gave the kids the MAT-6. Well the MAT-6 now is so foreign to the way I teach. I can't speak for somebody else, but it's really foreign to the way I teach. Where the CBAAM is certainly in line with what I teach. The concept of the CBAAM is definitely in line with what I teach. And for myself I give it more credence...than I do the MAT-6.*

*I: What do you do with your MAT-6 results when they come back?*

*N9: I think they send them home. They use them for determining gifted and talented.*

*I: Do you use them to make any decisions?*

*N9: No, because it's just so foreign to what to what I do now. Multiple choice is so...*

*I: So...it doesn't give you the kind of feedback you need about what you're doing in the classroom.*

*N9: No, no. And it certainly wouldn't lead me...to teach...to do that either. You know I just don't find it as meaningful as I used to. And...I don't worry about the results now. I used to worry about the results. I don't. It doesn't go with my curriculum so...*

N10

*N10: The MAT-6 is nothing. It is a waste of money. It's a waste of time and just freaks the kids out to all of a sudden have to...*

*I: Why do you think it freaks them out?*

*N10: It freaks them out because we don't do a whole lot of just straight computational kinds of questions that they say divide into this. It has nothing to do with what they're doing in class.*

*I: Do you ever use those kinds of formats...like the MAT-6?*

*N10: I don't. I don't use that format at all. We do...all of our math writing in a Math...notebook. They do all their problem solving and all the writing to explain you know what they've done. We keep everything there.*

*I: Well, what do you do when you get the results back at the end of the year? What do you do with those results, with the MAT-6?*

*N10: These go home...MAT-6 results go home to the parents.*

*I: So what do you do with the teacher results?*

*N10: Throw them out.*

*I: Do you look at them and change instruction as a result?*

*N10: No.*

*I: Do you evaluate what skills your kids are doing well on as opposed to not so well...with the MAT-6 results?*

*N10: Well, I don't...I don't hold much weight in the MAT-6 at all. I know the parents do. And so they want to know what happened here and why didn't my kid do well? I say well, that's not the way I teach...and...unfortunately the assessment tool does not match the curriculum nor the innovations that have been made as far as learning and how to explain.*

Instructional Alignment. According to teachers, the format of the CBAAM was more aligned with typical classroom activities. In addition, teachers are making less use of highly structured materials, including problem sets, text books, and multiple choice formats. This makes the CBAAM quite valuable in communicating essential content and constructed response problem format among teachers, parents, and students. It should be noted that the district encouraged teachers to *discuss* the CBAAM results with parents, but not to send home scores or papers without some formal communication. Several teachers planned to include the CBAAM in parent conferences where the mathematics instruction and the CBAAM results could be described.

When discussing the CBAAM results, the teachers recognized that the CBAAM does not thoroughly assess computational skills or algorithms taught in the primary grades. A few teachers indicated that a combination of the MAT-6 and the CBAAM results would provide the best picture of student performance. However, because of the perceived misalignment between the MAT-6 and classroom instruction most interviewed teachers limited use of results to "mandatory" requirements like placing them in the student folder, sending test scores to parents, and using them to identify gifted or Chapter 1 students. Only one teacher described analysis of whole-class results and specific linkages to classroom instruction. Based on teacher comments, the CBAAM seems to better serve teaching/instructional functions, while the standardized norm-referenced test serves primarily administrative functions.

**Articulation/ Alignment of the CBAAM**

Most teachers interviewed in this study, saw close alignment between the CBAAM and classroom process. They see the CBAAM as measuring important mathematical ideas. They have concerns about the specific content tapped in the CBAAM problems, yet, they changed their instructional sequence and curriculum content to accommodate the assessment and they did use the CBAAM results within their individual classrooms. This next section of the report discusses how the CBAAM is one mechanism that fosters articulation of content standards at the district, school, and classroom levels. The CBAAM fosters articulation of the mathematics content standards by illustrating complex, open-ended activities. The assessment provides opportunities for teachers and students to engage in tasks similar to CLAS type items. This is particularly important given that the interviews provided evidence that teachers have limited opportunities to discuss the new curriculum frameworks and coordinate and communicate between and across grade levels. There was some evidence that teachers at some sites were collaborating with their peers on the mathematics program. These efforts, however, appeared self-initiated and were not systemic in nature. In this context, the CBAAM, its development, administration, scoring and review of results become an important vehicle for articulating important content and illustrating what performance looks like.

Within and Between Grade Articulation. The CBAAM is one step in preparing students and teachers for what is expected by the new frameworks and what will be measured by state assessment. The interviews provided evidence that within grade levels there is considerable variation in the amount of discussion and interaction among teachers about mathematics curriculum and specific content. The following quotes illustrate how the within grade articulation is dependent on the school-site, or individual teacher.

> N9
> *Our program here...at least once a month we have grade level meetings with just our own colleagues. There's another third grade teacher and I who initially took the Marilyn Burns Math Program and started it. It makes a whole lot of difference. We all know where we are and what we're doing. And what our goals are, even though we may do it in a different way, we're all in that same track.*

> N11
> *I think it's horrible. We don't, at this site, do any grade level planning together. We don't...do any...collaboration among teachers here. So it doesn't happen for...I mean a number of reasons. But...personalities...although it's not a personality thing. It's just a matter of allocating the time to do it.*

There was less variation in cross-grade articulation, but the interviews suggested that it is generally weak and less formal. However, there is some evidence that it is beginning to occur. Teachers reported awareness of the need for coordination across grades. The articulation occurs through informal interactions among teachers from adjacent grades and the sharing of materials and assessment tasks. Teacher comments indicate a pervasive desire for better communication and coordination of mathematics programs across grade levels. There is a strong sense that this is necessary to prepare students for the new challenges that face them. Teachers recognize that success on new assessments and the curriculum that coincides with them, speaks against maintaining cultures of isolation (Jamentz, 1993).

> E10
> *I'm seeing some of the changes. And I think basically a lot of the changes start in first grade and kind of work their way up. But I think they need to be more organized. More feedback between the grade levels. And we have tried here to do that. But in order to do it...it either has to be before school, after school or...*

> E3
> *I think that's what the other teachers found too...is that if the kids are not there, and even though you go over to them and show them what a three, four or five, should look like it doesn't do them a darn bit of good if they're not there. And I think getting there means starting it kindergarten...*

E4

*Well, one of the things that I really enjoyed was when we had the staff development day for the CBAAM. They gave us packets of things that we could take and try immediately in the classroom. Another thing that would be helpful is to provide teachers at every grade level with examples of the kinds of things that they could, or should be doing? Not only to prepare the children for these kinds of assessments, but I have heard some of the teachers saying...in first grade or second grade, well what kinds of things should we be doing. A lot of the things...the kids should already know. They should already have some experiences...and not...we get the test in two weeks, we have to teach them everything that they're supposed to know. Because it's just not going to happen. They need a lot more time to get used to the ideas.*

E6

*That's my sense of it. And we're getting no support at all in first and second grade levels to get some more writing built-in and to get the discussion of math concepts built-in, because they're obviously very shocked. That's real unfair to the CBAAM as a pre...if it's intended to be a precursor to CLAS.*

E7

*To tell you the truth, I'm just not sure about the lower grades. Just...being new here...I haven't had a lot of interaction. We have different lunches, different recesses, different everything. So I just feel like at our school the upper grade teachers, which includes me too, the third grade and up, really don't do a lot of discussion with kindergarten or second grade teachers. I don't think you can expect third graders to all of a sudden do really well with the CBAAM if they have not seen it before. So I think they should definitely be starting off in kindergarten. Obviously kindergarteners aren't going to be writing, explaining, and thinking on paper. But talking about it in class and maybe having a teacher doing writing for them and having them see a lot of it (might help).*

E40

*The CBAAM problems are better, but need to include quality models (examples) for students - so the child can see what to strive for. The project has helped to change curriculum and instruction and should be brought down to second grade and below. Field testing with a variety of classrooms would insure we are assessing what is intended.*

N8

*There's an attempt to do some cross-grade level articulation. It hasn't happened yet, but it's been written into the plan for next year...that it be done on a formal basis. I have found...anytime I've gone and asked, I've found the support there very strong. But it's a matter of going and looking for it because you don't have the opportunity.*

N9

*There's been a change in second grade teachers...and particularly in the last couple of years. Far more of them have gotten on this track. Which makes it much easier. The second grades are doing a lot more and so are the first grades. So it's working its way down.*

N10

*It's very...concept building. It has to start from kindergarten in approaching these problems. You cannot just all of a sudden get to the third grade and say hey they're ready because I've been teaching this way the whole year. It starts in kindergarten and it builds...*

<u>The CBAAM Becomes a Vehicle for Articulating the Framework.</u> It is unlikely that the curriculum framework itself will significantly impact teaching and learning in Mt. Diablo classrooms. Most of the teachers interviewed were aware of the framework, had read portions of it, but did not use it as a foundation for their instruction. The following excerpts reveal the perspective that frameworks are valuable guidance, but of limited utility for altering practice.

E1

*I: Do you get a sense that teachers are using the 1992 Frameworks as guidance?*

*E1: Do you want the truth? That's not reading that you sit down and enjoy...at the meetings in math. We took a whole day...many teachers in the district, and did a bird's eye view of the framework. That's what I presented to the rest of the faculty here...is the bird's eye view because I know they're not going to sit down and read it unless somebody makes them. There are too many things to do. You know, if can you just keep your head above water, and survive, and get the papers graded, and get tomorrow's work ready and everything...and the last thing you want to do is to sit down and read a math framework.*

E5

*E5: Certainly...being an old timer I wouldn't of been that eager to get into it...if there hadn't been...the CBAAM as a way of evaluating how your children are doing in the so-called new math.*

*I: Have you read the framework, the '92 Framework?*

*E5: No,...although it would be a great way to go to sleep, probably. I've read parts of it at different times...but only...here and there. I've never actually sat down and read the whole thing.*

E7

*The new framework...I haven't read it completely. I've gotten a brochure on it that gave me an overview of it but I haven't read the framework. I'm familiar with the framework previous to that which was...I guess...kind of similar...is what I've been told. There's some changes, but in general it seems like it's kind of on the same track.*

N9

*I think in as much as it's (Framework) helped to keep me on track. I mean in other words it also verifies what you're doing. Since the framework, the new framework does deal so much in problem-solving math. It's a tool to keep you on track. A guide. And I use it that way.*

N43

*I feel the CBAAM helps teachers who are hesitant in trying new techniques to get going on the new framework. I feel that the CBAAM was in-line with what I have been teaching in class. I would like to give the test in March instead of January.*

Other intermediate activities, such as informal grade-level meetings and CBAAM activities, translate and bring to life the ideas in the framework. In a similar way, formal participation at inservices such as "Marilyn Burns workshops" may be one of the mechanisms for translating the ideas in the mathematics framework into classroom practice. Given that teachers report using a less standardized curriculum in their classrooms, it is critical for assessments, of any type, to communicate what is important and valuable mathematics. From both the teacher and district perspective this can help educators identify, select and use relevant instructional strategies and materials. If teachers rely heavily on texts to sequence and structure their classroom instruction, they may be less reliant on mechanisms, such as the CBAAM, to determine direction for their programs. This interview data suggest that teachers are moving away from classrooms that are structured by texts, therefore it is incumbent upon the district to provide tangible linkages from the state level frameworks to classroom activities.

During the CBAAM item development and at the district-wide inservices for third grade teachers, explicit linkages were drawn between CBAAM items and the unifying ideas and content strands in the 1992 Framework. However, in contrast to this, several teachers commented on the lack of alignment between CBAAM content and district-level mathematics guidelines. Although they recognized that the district guidelines were published prior to the framework, they were concerned about the different messages that various components of the mathematics education system are sending to teachers, parents, and students. In this period of change, teachers are struggling to maintain a balanced approach to mathematics curriculum and instruction and there is a strong sense that explicit guidelines and major assessments should be consistent and reflect that balance. Forging the balance involves integrating basic computational skills with challenging problem solving and investigative

approaches, as well as, synthesizing new content and pedagogy in ways that are meaningful for students. The CBAAM is not just an informal assessment; it's a statement about important mathematics. Teachers want these statements - curriculum frameworks, district curriculum goals, the CBAAM, and other assessments - to be aligned.

Creating and sustaining a challenging mathematics program involves much more than revising district guidelines or discussing state curriculum frameworks. At the heart of the matter is the strength and success of a professional development program that enhances the capacity of teachers to engage students in challenging content. The scope of the CBAAM project (it has affected all third grade teachers for four years) provided an opportunity to relate teachers perceptions about professional development in mathematics to the CBAAM project.

**Professional Development Directed Towards the Mathematics Program**

In general, professional development in mathematics comes from a combination of sources, including: preservice training; inservice opportunities within and outside the district; interactions with students, peers, and other educators; and individual endeavors to develop competence. The CBAAM is an example of a district initiative that supports the revitalization of mathematics programs and links this to the ideas set forth in the NCTM standards and the California curriculum frameworks. In this context, working on the CBAAM development teams, administering and scoring the assessment, and interpreting student results can be viewed as a substantial professional development activity for participating teachers.

Structured opportunities for professional development in mathematics are particularly important when considering that elementary teachers generally have little formal training in mathematics. Typically, they take one or two courses in mathematics content and a course in teaching methods. It is not unusual to find teachers who have no specific mathematics training, because elementary preservice programs have historically been laden with reading, literacy, and language arts coursework. This makes ongoing professional development programs in mathematics all the more critical.

E1
*The minimum. I went up through...algebra and geometry. Did okay there, but when they came to calculus and stuff, I went to music. But music is nothing but math with sounds to it.*

E6
*Most of us can muck our way through addition and subtraction without a lot of help, but when you get into broadening math beyond arithmetic...into the whole scope of it, you have to know some physics and you have to know some geometry, and some algebra, and all that...I think we're probably weak.*

N8
*The Elementary Mathematics is simple to understand from the kind of background I had. If I were going into teaching at the High School I would need a lot more training of course. But...actually, I don't really feel that in my credential program they did a good job of showing me how to teach children...how to teach math. Since then I've been in the district and I've gone to lots of workshops. The district has had a lot of in-service training that has helped me learn...helped me learn to teach math better.*

Framework Consistent Intermediate Activities. In their research on the impact of the 1985 Framework, Cohen et. al. (1990) expressed a major dilemma posed by mathematics reforms: "How can teachers teach a mathematics that they never learned, in ways that they never experienced?" (pg. 6). They explored the complexity of large scale curricular reform and the difficulty of producing change driven by state policy. The primary difficulties were not in accepting the new policies, but weaving them into daily practice. They found that teachers implemented many elements of the frameworks, both content and pedagogy, but tended to organize these new elements within the structure of traditional school mathematics. Implementation of the new ideas was "filtered" through the older and more traditional mathematical and pedagogical structures. Thus, teachers had much to learn, and *unlearn* in order to translate the frameworks into practice.

Research findings pointing out the piecemeal adaption of "new" mathematics practices by teachers may be due, in part, to the piecemeal nature of support and professional development that they receive on their journey. Given the magnitude of changes proposed for elementary mathematics teachers, it follows that enormous resources are required to put fundamentally new practices in place. Yet, school systems continue to rely on college courses and short-term in-service programs when the demands of new reforms call for long-term

professional development activities that engage teachers in new learnings and the redefinition of practice over many years (Little, 1993). These long-term experiences are necessary to translate the challenging ideas in the frameworks into meaningful classroom actions by teachers and powerful new learnings for students. In the discussions with Mt. Diablo teachers, they tended to view the CBAAM as a translation activity that helps articulate the ideas in the framework.

> N8
> *My understanding is that there's been a lot of growth in 50% of the third grade...teachers moving from a more traditional teaching style to some of the newer...approaches. And I think the CBAAM has had an impact. Because I think it gets right down into the classroom, whereas if it's just a framework that sits on your desk, you may never actually bring those...theories into practice.*

Teacher Perceptions of Formal In-service Opportunities. Formal mathematics in-service opportunities have also been available through the district. The interview data suggest that although a variety of in-service has been available through the district, teachers expressed concern that they are not a long-term systemically oriented program. Nor do they provide in-depth treatment of a central mathematical idea in relationship to the essential strategies required for successful instruction. For example, most teachers reported attending in-services provided by Marilyn Burns, or based on materials or videos authored by Marilyn Burns. Some of these in-services were sponsored by Mt. Diablo, others were outside the district as part of summer retreats or national workshops. For teachers what makes the in-service attractive is that it does not focus simply on mastery of mathematical ideas, but serves as a basis for the translation of these ideas into accessible instructional strategies. Many of the mathematical ideas presented in the framework are complex and represent new classroom content. Similarly, the CBAAM helps teachers to illustrate and translate some of these ideas into classroom practice. Some Mt. Diablo teachers report ample opportunity for their own professional development. Others were not aware of these opportunities and still others, were aware, but opted to not participate. The interview data demonstrate that opportunities are available when teachers take it upon themselves to identify and participate in training. However, there is a strong sense among teachers that the district support does not present a coherent, long-term strategy for upgrading the mathematics program. They see the CBAAM as one link in the chain, but often stressed the need for more opportunities to work together in both formal and informal ways.

**Informal Opportunities.** Information from a formal in-service or the CBAAM administration may only represent the first step in the cycle of collaboration necessary to enhance one's capability to engage in teaching practices demanded by the new reforms. The next steps require applying newly acquired knowledge, sharing successful strategies with colleagues, and reflecting on one's own practice. These reflections enable teachers to refine and improve their pedagogy. It is these changes in teaching that sustain new opportunities for students. Dialogue and collaboration are the informal opportunities that can buttress these new learnings.

Interview data demonstrate the desire for increased interaction within and across school-sites to accelerate the substitution of new practices for old. Teachers expressed a need to work with each other to implement new ideas and not have external consultants or experts define the pathways to success. Without adequate opportunity for collaboration, the changes will be spotty and not reflect a fundamental transition from a lock-step curriculum centered on sequential computational skill acquisition to one balanced with teaching for conceptual understanding. Based on the interview data, Mt. Diablo third grade teachers are clearly in the midst of this transition. Yet, they are struggling to make sense of the complexities of the mathematics reforms with little time and few resources.

> E1
> *I've had one opportunity in my 20-something, well next to 30-years in the district. One of our staff development days we did a trade where we went to different schools...and watched a program. I saw something I liked, picked it up, and have used it ever since. So I think it would be good. One thing that disturbs me is the new teachers coming out of college...that are being stuck into a classroom with no help.*

> E2
> *I think even if they did [collaboration]...kindergarten, first grade together, and then have them break into groups and come back and talk to one another...a day or two days. Second, third or...that kind of thing...going up. What bothers me so much about this is you don't see an awful lot of it.*
>
> *What we're doing is good but we need to do more of it. And I think we need to do more of it in schools, I think there needs to be more from the principals. I think there needs to be more of an in-house look. Not pointed, but making the stuff available for people. Chances for people to team up and talk and be in teams just like we do with the kids.*

E3

*I: Are teachers involved in professional development on a regular basis? Is the district going through some staff development in math?*

*E3: I think that's their goal, but there's no blueprint right now. There's nothing to get your hands on at this moment. No.*

E4

*Well, I think it would be helpful to...maybe some teachers won't do it. It's the same thing like with the other third grade teacher that...was supposed to go to the CBAAM in-service and then didn't. So I picked up all of the information and gave it to the teacher and gave all the examples of the things that I was doing, but I really don't think that the teacher did any of them. I really don't. Maybe he did but...I don't think so. And so I think that it might be helpful to have some kind of math fair for each grade level. I know I've seen some schools that do that, and each class would be given the opportunity to work on a certain type of problem and then they would present in a multi-use room or something like that, all of their solutions.*

E5

*We're lucky in that we all like each other and want to...work with each other on that kind of thing (math). It's a good group...we always eat lunch together and we're always talking about things...where we should be next and that kind of thing, and we have a shortened day on Wednesday so that every fourth Wednesday is a so-called...well every third wednesday...is a so-called grade level meeting. And then we talk about things.*

E7

*My understanding is that there hasn't been a new math adoption for quite sometime. And so all the math books that we have that the school adopted are all kind of...there really isn't any open-ended questions in the math book. There are some word problems, but most of it is just old-fashioned...what I would consider old-fashioned math. And so I feel if I was given a unit...you know units to work on, I would teach it more. But I feel...a lot of teachers are really frustrated because here they're having to scrape for materials and to get problems from this teacher, and get a book from this teacher and it...almost seems like it's piecemeal. I mean, that's how I feel. I've bought three books myself...Marilyn Burns books...I bought a replacement unit for Marilyn Burns but, I just feel I'm pulling things from here and there. Whereas, I have a good friend who's teaching in another district and there the principal has bought a...unit. A math unit that she's piloting, and I looked at it a little bit, and really...it's not a textbook. It's a big book. It's a binder.*

N8

*I would like to see more sharing. I think there are a lot of teachers with talent and knowledge that don't share back and forth. Within our school we're pretty good about that, the way we have our meetings set-up. We meet at least once a month formally as a third grade. And we do work closely with one another.*



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*But I would like to know what's going on in other schools. I had an opportunity to visit some other schools as a result of a proposal that I wrote. I spent some time in three or four other third grade classrooms. And I found it very valuable. And I think that kind of thing is good. I think anytime you can get together and just share what you're doing in your classroom...you bounce ideas off of each other.*

N9

*Well, assuming that they're holding in-services. As I say some of that stuff comes across my desk and I don't even look at it. I don't know. Maybe they could set up a visitation program? Visit classes where it's working and it's working okay, and see if they can't help people become more comfortable about it. There's a lot of people that...are just afraid of change.*

N10

*Teachers need release time. A list of people that are really into hands-on math and writing in math and integrating the curriculum. Teachers need to have, even once a month, or twice a month, some kind of release time to go and visit and see, and then have a support group that you can come back and share...what worked for you, what didn't work for you. I had this problem...somebody helped me solve it. That's what's going to make people really feel comfortable enough to own it, to feel excited about it, to move forward with it. Without that support they're going to just say here, this is what CLAS is. You're not going to get anything. I think most people on-site here are feeling more and more comfortable because we do communicate with each other. But if you're talking across the district...I think the district needs to make a commitment. The district needs to make a commitment to supporting teachers and to educating teachers and the community.*

N11

*I think there was one on probability. But, it wasn't taught by teachers. I mean it needs to be. I know what probability is, and I can go learn what probability is. I mean there is enough books out...you can just get a book on probability. But it needs to be third grade people teaching these third grade skills, and coming up with some neat ideas and some good ways to do it that works.*

<u>The CBAAM as a Formal Professional Development Activity.</u> Teachers discussed a wide array of professional development activities, but the CBAAM initiative was seen as the only district-wide, long-term effort. Some teachers, even those making substantial contributions to the project mentioned that the CBAAM effort fell far short of what is required to make the changes proposed by the framework. However, some teachers have participated heavily in CBAAM related activities. They have constructed items, administered the assessment, and scored and reported results; while others have only administered the assessment in their own classrooms. The level of involvement mediates the benefit to teachers and students. This

research does not credit the CBAAM as primary cause of recent changes, but identifies its critical role in supporting difficult and time consuming transitions for teachers. It does this primarily through communicating, combining, and modeling new mathematical ideas, content, and instructional strategies and sanctioning them in the classroom. Based on the survey and interview results, a large majority of teachers believe that the CBAAM models important ideas and strategies or contributes to the mathematics program and student learning. In most cases, teachers' attitudes toward the CBAAM were positive, but in many cases this type of assessment and the related instruction represents a departure from "business as usual" and places demands on teachers that make the transition difficult. Even if a teacher is positively disposed to the philosophy underlying the CBAAM, the increased demands for planning the requisite changes necessitate district sanctions for formal and informal professional development beyond teacher participation in the CBAAM assessment project.

**Teacher Concerns About the CBAAM Administration and Procedures**

It was apparent during the interviews that many teachers were not clear about the specific purposes of the CBAAM project, how the assessment information was to be used or not used by the district, and the saliency of specific administration procedures. Most concerns involved uncertainties about the administrative procedures they followed when giving the assessment. The CBAAM procedures extended over several days, involved group activities and permitted the use of manipulatives and other classroom materials. The pronounced differences between this type of administration and standardized assessment procedures was the source of much concern by teachers. Some teachers were unclear about the amount of help they could provide to individual students. They wondered if it were appropriate to repeatedly prompt students to write more or provide additional detail in their answers. Other teachers reported difficulties with students who could not easily understand the CBAAM format. Some special needs students found the instructions too complicated and were unable to begin the assessment. Some teachers reported that LEP students found the writing burden of the assessment excessive. Teachers commented that often their highest performing students' found it challenging to generate problem solutions and write with clarity and supporting detail. By extension, they believed that low performing students would experience even more difficulty in presenting ideas they may understand but do not

express well in writing. Teachers differed in the amount of time they permitted students to work on the assessment. This time variation caused many teachers to question the validity of the results, given that students experienced different administration procedures. During the administration, some teachers had posters and materials on display in their classrooms that might have facilitated answering the CBAAM problems. Several teachers questioned the appropriateness of this practice. Following are just a few examples of these concerns:

> E4
> *They were allowed to get up and walk around, and they were allowed to use color tiles if they wanted to. They were allowed to use construction paper. I told them they could use any of those things if they wanted to. I didn't go as far as one teacher did, which was to provide them with construction paper...with little dotted lines on it. And that...I thought...that is...I'm sure that that's not acceptable. I mean that's just too much. But again it was hard for me as an educator to know what is too much. You know they said, "Tell them to get out of their seats. Tell them to go around and look at the boards, you know and look at all the problems they've done previously." I thought, I don't...know, I hope I'm doing this the right way. I hope that other teachers are doing this, and that way it will be fair. But I wasn't really sure.*

> E7
> *On the part I wasn't sure...I don't remember now what the directions said. It seemed kind of...open as far as it didn't say you have to give your students an hour and you must cut it off at that point. So, I don't know...I'm not sure I did it wrong by giving them extra time, but with the CLAS test last year I seem to remember there was a part on the directions that said give the kids the time that they need...so.*

Teachers administered the assessment to their own students. When teachers were uncertain of specific administrative procedures they often made their own interpretations. In many cases, teachers appeared to take greater license with the administration because of the use of classroom materials and the instructional nature of the assessment itself. What is most interesting about the variations in administration, is not that they occurred, but that the teachers' response was basically to place additional restrictions on the assessment that are more consistent with high stakes testing.

**Elevating The Stakes of The CBAAM**

The Mt. Diablo school system has developed the CBAAM to provide information on student achievement using open-ended, constructed response performance tasks. Purposes for the CBAAM include: (1) illustrating the types of tasks that are aligned with the Mathematics Framework (CDE, 1992), (2) exposing students and teachers to the types of items they will

experience on state assessments, and (3) making information available to students, teachers, and parents about performance assessment and the concomitant instructional opportunities required to enhance student performance. Rigorous standardization in terms of administration procedures, elaborate analysis and use of results for accountability are not the district's intended purposes. Concerns voiced by teachers about variations in administration procedures are consistent with district efforts being directed toward involving teachers in the development, field testing, scoring and use of results in their classrooms--and not indicative of an assessment created for accountability and high-stakes use. Much of the variation in administration described by teachers is a by-product of the intended purpose of the assessment--mainly to enhance student and teacher capacity to engage in complex, yet, instructionally-sound assessments. Accomplishing this is a long-term, evolutionary process that is not easily attained, especially when one considers these assessments to represent significant change for participating teachers and students. The district encourages teachers to prepare students for the assessment by using instructional materials and strategies related to the assessments. In essence, the CBAAM represents a district sanctioned opportunity for students and teachers to prepare for higher stakes state assessments that assume district alignment with curriculum frameworks.

Yet, teachers tended to elevate the stakes associated with the assessment in a number of ways. In both the survey and interview responses, teachers expressed concerns about the legitimacy of allocating instructional time to prepare students for the CBAAM. If preparing students for assessment is not appropriate, then engaging in preparation activities is at the expense of precious instructional time - high-stakes for students and teachers.

> E5
> *Well, I'd say it's interfering to some extent and that we did do some prep because we didn't want the children to go in cold, especially like with the "Carnival" thing. So that took...a long time. It probably took about a month out of our math program to get them ready, and then...it took...two weeks to give it. So six weeks...but...I don't feel like that's a waste or anything. It's still math...*

> E6
> *I did not make it obvious to the kids that it was a test...we were preparing for a test. Because I want them know that this is just math and...this is how I always expect them to think their...play out their thoughts...I mean write them down and be clear and all that.*

E7
*Well, I tried not to because I didn't want to. I didn't want to make it seem obvious that we're doing this schedule today because of the CBAAM. I really tried to...blend it with the program because I really didn't want to...I didn't want to make them believe that they have to try hard on this schedule because this will be on the test.*

N11
*Even if somebody gave me the test and showed it to me...two months ahead of time. I go back and forth between...do I even want to do that? Is that an accurate assessment then? Should I spend the months ahead of time and teach them how to fill out a schedule?*

Several non-involved teachers believed that an assessment or test is supposed to illustrate what students have learned, but without explicit preparation for that episode.

N9
*This year ('93-'94) was beyond the scope and sequence of the district guidelines - it was not developmentally appropriate and I taught to it specifically. Therefore, it is not a measure of children's competence in the areas tested.*

N11
*[I spent] a week teaching to the test so that my students would be able to do it. This makes them feel successful, but make the results meaningless.*

N12
*I support the idea of the CBAAM, however, the questions must be such that stud ents can pull from their prior knowledge and background. The "Carnival Problem" was not one of those, and students really needed to be taught many lessons for them to have a clue. And this teaching to the test is something I will not do and don't believe the purpose of the CBAAM is to assess what students know about what I just taught them. This negates the intention of the CBAAM, as I understand it.*

N49
*The assessment of children in this manner would be truly meaningful if were done in all grades prior to the CBAAM. It is artificial because we had to be given sample activities and suggestions to prepare the children for the assessment.*

What motivates educators to believe that it is wrong to prepare students for specific targets? Is it wrong to teach students *exactly* what we want them to know and be able to do? Teachers have been socialized to believe it is unfair to arm students with specific information that enhances their performance on tests. This reflects a concern that preparing students destroys the validity of the results, particularly if the results have consequences for students

or teachers. This belief is a carryover from what is required to ensure the integrity of the results of a high-stakes standardized test. In fact, the tone of some of the comments reflect teacher anxiety about walking a fine line between preparation and cheating. An interesting complication of this perspective is a concern that students would not be adequately prepared for what was a new and complex assessment experience. Many of the teacher comments chronicled in the "Impact of the CBAAM" section of this report, illustrate how teacher concerns for student readiness caused them to resequence or alter their instruction. Within their own classrooms teachers sensed that they could only prepare students to a certain point, but the level of preparation tolerance varied significantly among teachers. This triggered inter-teacher comparisons that were interpreted as breaches of fairness, because of the disparities.

E6

*The only thing that really gripes me is that some teachers wrote the answers for the "Carnival" on the board. They did it...the whole class worked together to develop a schedule and the kids copied it. Then that was scored as if a kid did it. So, you can score pretty well if the grown up does it and writes it down for you and the kids copy. So that's the only thing that gripes me, cause I know for sure my kids, bona fide, earned their score.*

E4

*Even within our school...I know that there's one teacher that totally prepared and really helped them out a lot, and...just did a really superb job. I know that the students in her class did really well on the test. There's another teacher that...I could almost promise did not prepare the kids for the test. Did not do anything above and beyond what that teacher would normally have done. When the test came in I happened to be in the room, and the principal let me look them over. And he was looking through some of the other tests and he remarked, "Wow, this one...you know one class is significantly lower than the other two classes." That's all ones and twos. The other two classes are all threes and fours and a lot of fives and even a couple of sixes. So I think that...I think that it doesn't... always measure what a student's true capabilities are. Because I think that we all want the kids to do really well and we want them to feel successful. And I think that maybe...even more guidelines for the teachers on what they should and shouldn't be doing would be helpful.*

The validity of the CBAAM depends critically on how the information is used. Rather than building capacity and moving forward, these comparisons tend to reinforce cultures of isolation (Jamentz, 1993). To counter this, teachers and district staff must foster a mileau of collaboration and collegiality that serves to improve instructional methods and student performance as they relate to complex performance-based tasks. Use of the CBAAM for

accountability, or to compare performance at the teacher and school level, speaks against this.

## VI. Conclusions and Recommendations

### Impact on Third Grade Curriculum and Instruction

The CBAAM had profound short-term effects on teaching and learning in third grade classrooms. Teachers resequenced content, introduced new content, and emphasized instructional processes as a direct result of the CBAAM. Even teachers who voiced negative feelings about the project made changes. This research documents the changes, but does not provide evidence bearing on the quality of the instructional modifications pursued by individual teachers. Evidence also suggests that there is a substantial long-term impact, primarily related to sanctioning changes in teaching methods and mathematics content consistent with ideas forwarded in state frameworks. The CBAAM, in essence, gives teachers permission to move away from the structure of traditional mathematics programs.

The research also reveals that the Mt. Diablo teachers were involved in changes in pedagogy long before the CBAAM project. Therefore, teaching tools and methods such as cooperative groups, manipulatives, writing and expressing ideas, and using problem-solving activities were already integrated into their instructional programs. However, in many cases, the CBAAM motivated changes in content fractured the traditional structure and sequence of their elementary mathematics programs - and they had little time to make the adjustments. Much of the proposed content is new learning for teachers themselves, as well as students. Encouraging and sustaining changes in the content of the mathematics programs will require substantial future support to, and cooperation among, teachers. Professional development should place much of the "new" mathematics content outlined in the frameworks in the context of sound pedagogical strategies that bring these mathematical concepts to life for both students and teachers.

### Use of the CBAAM Results

Teachers use the CBAAM results to reflect on their own teaching, to articulate content and performance standards with students, to encourage students to improve performance, and to a lesser extent to communicate with parents. This was in stark contrast to teacher comments about standardized test results. Standardized tests served primarily administrative functions and high stakes decisions (student placement) while the CBAAM information was used primarily in the service of classroom instruction.

**Professional Development**

Mt. Diablo teachers recognize the current transition period and are struggling to find the proper balance. On one hand, they embrace many of the new changes, on the other they recognize the merits of some traditional practices. They are exploring personal and professional growth in a forest of extremes; text books/no text books, alternative assessments/standardized tests, working alone/working together (students and teachers), computation/problem solving, on and on. They see the CBAAM as only one piece in the evolving strategy for systemic mathematics reform. However, they are concerned about the alignment of state and district guidance with the assessments. They are concerned about collaboration and coordination within and across grade levels. They are concerned about communication with parents, and they wonder about the time and resources needed to alleviate these concerns. They recognize that some combination of formal and informal professional development, that is essentially ongoing, will be required to strike the proper balance.

Getting teachers actively involved in the process of within and between grade-level articulation may be an important starting point. Professional development opportunities focuing on essential mathematics content, communicating how that content spirals through the years in more complex, yet meaningful ways. will help articuate the ideas in the frameworks and translate those ideas into meaningful classroom instruction. It is through these efforts that stakeholders including, teachers, administrators, parents, and students, will realize that success on district and state assessments in third and fourth grades is dependent on a coherent K-4 instructional program.

**Concerns about Assessment Driven Curriculum**

Clearly, the information presented in the Impact of the CBAAM section of this report, indicated that third grade curriculum and classroom assessment were altered in direct response to the CBAAM. However, some teachers were distressed by having the assessment drive the sequence and selection of content in their classroom. When a teacher resists spending time on content to be assessed, they risk not providing adequate preparation for students in their classes. This could result in poor comparisons with other third grade classes. In addition, they are concerned about students' own perceptions of the assessment experience and students' satisfaction with their own performance. Instead of viewing the

assessment as an opportunity to learn about student performance and improve it subsequent to the assessment, many teachers interpreted the CBAAM as a summative measure of cumulative mastery in the primary grades or mastery of third grade content. This interpretation substantially elevates the stakes of the assessment. It also diminishes the perceived validity of the assessment, because the assessment is only three items and covers limited content.

This concern is interesting, given that the district does not use the CBAAM for teacher comparisons, student certification, program eligibility, or other high stakes applications. Standardization of assessment administration can be critical depending on how the assessment results are used. In situations where score interpretations weigh heavily on the student, standardization becomes a central concern. In the case of the CBAAM, variations in the amount of time spent taking the test, grouping structures or availability of manipulatives and other materials may not compromise the integrity of the results. Teachers administer the assessment to their own students and use the resulting information in ways they deem appropriate to alter instruction or improve student learning. There are no district mandates specifying how the results should be interpreted or used by teachers. Thus, in this context, teachers play a major role in determining the stakes associated with the use of the CBAAM results. There in little doubt that systemwide assessments, whether they are state or district level, alter the course of instruction. Mt. Diablo should engage *all* teachers in discussions of the rationale for the current course and the intended effect on students. The essential question becomes; is the assessment driving instruction in the right direction? Common goals and shared understandings are essential in this period of transition. Beyond common goals, clear communication and understanding of intended purpose and resolution of uncertainty surrounding administration procedures will be necessary to insure the integrity of the assessment results.

**Assessment Consequences**

There are a constellation of consequences associated with the CBAAM. Many of these consequences are direct, such as substitution of instructional time with the assessment, increasing student opportunity, and placing greater demands on teacher planning. However, many consequences are teacher mediated. For example, a few teachers did not return the

assessment results to the students, because they did not want students to see their poor performance which might result in decreased motivation. These teachers interpreted the low scores negatively, rather than seeing them as an opportunity to revise or improve performance and enhance learning. Think of this same teacher viewing the assessment as a summative measure of the third grade mathematics content and cumulative learning in the primary grades, which she had little time to prepare herself and her students for. In addition, imagine the results of the assessment being made available to parents and the public. Each consequence taken independently does not significantly elevate the stakes of the CBAAM. However, when all these consequences are taken together, they can create a situation where the CBAAM results weigh heavily on the students and teachers. The communication about the purpose and use of the CBAAM needs to be precise and clear to teachers and parents. If this clarity is not present, there is a danger of creating an environment of resistance and elevated anxiety, that is primarily a function of the lack of information. The district should be quite aggressive about advertising the purpose of the CBAAM and the intended use of its results. It's not just the district that creates the stakes, but often other stakeholders construct a maze of consequences that elaborate and obscure the original intent of the assessment.

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# APPENDIX A

## Third Grade Items and Student Booklet from the 1994 Curriculum-Based Alternatives Assessment of Mathematics

## District-wide Results for Three CBAAM Items

Student Name _____
Student ID _____
Teacher Name _____
School Number _____

Place label here or fill in blanks

Curriculum-Based Alternative Assessment

of

# Mathematics

## Third Grade

TO THE STUDENT

Remember that you want to answer each question as clearly and completely as you can. Your descriptions and explanations are as important to your score on this test as finding an answer or solution.

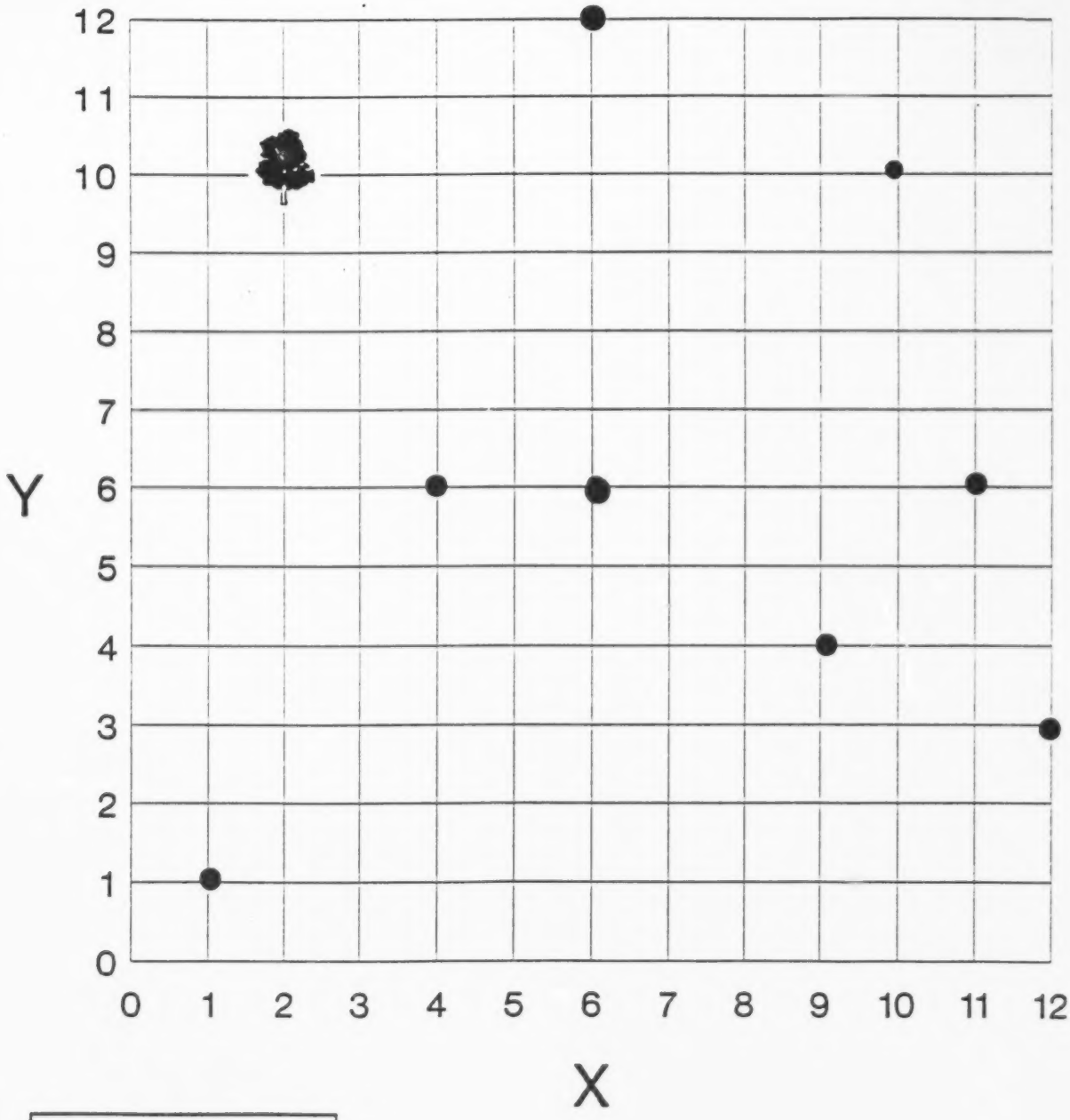
_____

NAME

*Mt. Diablo Unified School District*
*January 1994*

# Treasure Island Map

## Part One - Day 1




Key: 1 line = 1 block

1

# Treasure Island

Part I. In your group:

1. Complete the Compass Rose by filling in the missing cardinal points.

2. a. Find the Big Willow symbol on the map. Check its coordinate point. Now transfer the symbols for Devil's Cove and Wishing Well to the correct coordinate points on the map.

| | | |
|---|---|---|
| Big Willow | (2,10) | |
| Wishing Well | (9,4) | |
| Devil's Cove | (10,10) | |

b. With your group, select common symbols for the next three places.

Beaver Lake _____

Foot Bridge _____

Pirate Ship _____

c. Put your symbols on the correct coordinate points on the map.

| | |
|---|---|
| Beaver Lake | (4,6) |
| Foot Bridge | (1,1) |
| Pirate Ship | (6,12) |

3. Create a name and symbol for the remaining three coordinates, and place them on the map.

(11,6) _____ _____

(12,2) _____ _____

(6,6) _____ _____

## STOP! End of Part I

# Treasure Island

Part II.

While walking home from Treasure Island Elementary School, you noticed a crumpled piece of paper sticking out of a crack in a large tree. When you opened the paper, you recognized it as directions that appeared to lead to a hidden treasure. The note looked like this:

*Start at the Big Willow,*

*Go 8 blocks east*

*Go 6 blocks south and 1 block west*

*Go 3 blocks west and 2 blocks north*

*Go 2 blocks west*

*Go 5 blocks south and 3 blocks west*

*Dig here for the treasure*

With your pencil and the use of the map, find the hidden treasure by following the directions.

Write the coordinate point where the treasure is buried:

_____

Dig for Treasure Here.

# Treasure Island

Part III

Soon after you found the treasure, you heard the pirates were after you. You buried the treasure at one of the other symbols on the map. To fool the pirates, you chose a route with several turns.

1. Using a crayon, start at the Big Willow and draw your route on the original map. (Hint: Don't make it too easy for the pirates to find the treasure.)

2. Write a letter to a friend explaining how to find the treasure.

Date _____

Dear _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Your friend,

_____

Student Name _____
Student ID _____
Teacher Name _____
School Number _____ Class/Period No. ____

Place label here or fill in blanks

Curriculum-Based Alternative Assessment

of

# Mathematics

## Third Grade

TO THE STUDENT

Remember that you want to answer each question as clearly and completely as you can. Your descriptions and explanations are as important to your score on this test as finding an answer or solution.

_____

NAME

*Mt. Diablo Unified School District*
*January 1994*

## Carnival

I. The school carnival is coming up. Your class is responsible for the "Wet Sponge Toss" booth.

The carnival lasts from 10 a.m. to 2 p.m.

The jobs are:

1. taking tickets
2. passing out and picking up sponges
3. being the target

II. Show how you would organize the work schedule for your class's booth.

III. Tell how many students you will use to staff the booth and how long each student will work.

## Hershey Bar

You have asked three of your friends to come over. Your mother is in a good mood, and so she gives you a Hershey Bar to share with your friends. You take the wrapper off the Hershey Bar and see that it looks like this:

| | | | | |
|---|---|---|---|---|
| Hershey | Hershey | Hershey | Hershey | Hershey |
| Hershey | Hershey | Hershey | Hershey | Hershey |

Show and tell how you can divide this Hershey Bar so that all ***FOUR*** of you each get the same amount with no leftovers.

# 1994 District Results

Treasure Island Problem

| Score | Percent |
|---|---|
| 6 - Exemplary | 3.5 |
| 5 - Competent | 29.4 |
| 4 - Satisfactory | 19.6 |
| 3 - Nearly Satisfactory | 34.9 |
| 2 - Flawed | 10.9 |
| 1 - Very Poor | 1.8 |

Carnival Problem

| Score | Percent |
|---|---|
| 6 - Exemplary | 0.2 |
| 5 - Competent | 7.5 |
| 4 - Satisfactory | 24.5 |
| 3 - Nearly Satisfactory | 30.1 |
| 2 - Flawed | 30.6 |
| 1 - Very Poor | 7.1 |

Hershey Bar Problem

| Score | Percent |
|---|---|
| 6 - Exemplary | 1.1 |
| 5 - Competent | 13.1 |
| 4 - Satisfactory | 34.3 |
| 3 - Nearly | 32.1 |
| 2 - Flawed | 14.9 |
| 1 - Very Poor | 4.4 |

# APPENDIX B

## Third Grade Survey and Cover Letters

## Interview Guiding Questions

Far West
LABORATORY

Dear Teacher, January 30, 1994

The Mt. Diablo Curriculum-Based Alternative Assessment of Mathematics (CBAAM) is one of many local assessment projects supported and studied by the California Assessment Collaborative (CAC) and the Far West Laboratory. The CAC and Far West Laboratory are working with Mt. Diablo staff to document and understand the impact of CBAAM implementation on teaching and learning. For several years, staff from the Far West Laboratory have participated with teachers in planning and development sessions. To better understand the impact of CBAAM implementation, we would like to hear from teachers beyond the development teams. In order to do this, we have received permission from the Mt. Diablo School District for third and sixth grade teachers to complete a short survey and, if interested, participate in a follow-up interview.

The enclosed survey should take about 20 minutes to complete. We are requesting all third and sixth grade faculty who teach mathematics to complete the survey. The first page asks for background information and the next five pages ask you to use a rating scale to respond to statements. We value your input and welcome additional comments. Please use the space provided at the end of the survey for this purpose.

The final page of the survey invites you to participate in a follow-up interview in late February. Interviews will be conducted at your school site at the end of the school day. Far West Laboratory will pay a $40.00 honorarium to each teacher involved in an interview. The interviews should take about 60-90 minutes. We are interested in hearing from teachers with different backgrounds and different levels of participation in the CBAAM development. Approximately 20 teachers will be selected for individual interviews.

Please return the survey and interview request to Far West Laboratory by February 18th. We have enclosed a stamped, self-addressed envelope for mailing. A summary of the survey results will be returned to all third and sixth grade teachers. Your responses will be kept confidential and in no case will data be linked to individual teachers or schools.

Thank you very much for your time.

Sincerely,

Peter Ryan
Research Associate
Far West Laboratory



Far West Laboratory for Educational Research and Development
730 Harrison Street San Francisco, CA 94107-1242 (415) 565-3000 FAX (415) 565-3012

MT. DIABLO
CURRICULUM-BASED ALTERNATIVE ASSESSMENT OF MATHEMATICS SURVEY

Name: _____ School: _____
(optional)

Phone: ( )_____ Grade Level: _____ Years Teaching: _____
(optional)

| Content Areas Taught: | Number of Years: | Content Areas Taught: | Number of Years: |
|---|---|---|---|
| All subjects (Elementary) | _____ | History/Social Science | _____ |
| English-Language Arts | _____ | Visual/Performing Arts | _____ |
| Math | _____ | Foreign Language | _____ |
| Science | _____ | ESL | _____ |
| Other_____ | _____ | | |

Subject Matter Preparation in Mathematics: (Check all that apply)

Minor(BA/BS) in Mathematics ____
Major(BA/BS) in Mathematics ____
Advanced Degree in Mathematics ____ Degree Earned _____

Related Degrees (Please describe)_____

_____

Professional Development other than Formal Degrees (e.g., subject matter projects, EQUALS)

_____

_____

_____

_____

Involvement in Mt. Diablo Curriculum-Based Alternative Assessment of Mathematics (CBAAM).
**Please check all that apply:**

| 91-92 | 92-93 | 93-94 | |
|---|---|---|---|
| ____ | ____ | ____ | I was not involved in any CBAAM development, field testing, or scoring. |
| ____ | ____ | ____ | I was involved in assessment item development. |
| ____ | ____ | ____ | I was involved in piloting or field testing items. |
| ____ | ____ | ____ | I participated in scoring CBAAM student work at the district level. |

## A. Student Experiences

Please use the scale below to estimate the frequency of student participation in the following activities in your mathematics classes.

| | Rarely | Monthly | 2 x Monthly | Weekly | Daily |
|---|---|---|---|---|---|
| 1. Students write about their mathematical thinking to support and clarify their solutions. | 1 | 2 | 3 | 4 | 5 |
| 2. Students work together on problems, sharing and discussing ideas, strategies, and solutions. | 1 | 2 | 3 | 4 | 5 |
| 3. Students use tools such as manipulatives, calculators, computers, and rulers. | 1 | 2 | 3 | 4 | 5 |
| 4. Problems and instructional activities require students to apply mathematical ideas to the world beyond the classroom. | 1 | 2 | 3 | 4 | 5 |
| 5. Students use as visual representations, computational algorithms, and models to to illustrate math thinking. | 1 | 2 | 3 | 4 | 5 |
| 6. Students work independently to complete problems focusing on mastery of specific computational skills. | 1 | 2 | 3 | 4 | 5 |
| 7. Students are exposed to complex open-ended tasks that have multiple solutions. | 1 | 2 | 3 | 4 | 5 |
| 8. Students complete tasks that involve investigating mathematical ideas over extended periods of time. Problems and related activities may involve several class periods over several days. | 1 | 2 | 3 | 4 | 5 |
| 9. Students reflect on their work (orally or in writing) to express new learning or understandings. | 1 | 2 | 3 | 4 | 5 |
| 10. Homework involves formulating, completing, or revising open-ended tasks. | 1 | 2 | 3 | 4 | 5 |
| 11. Students use scoring rubrics or scoring criteria to evaluate their own work. | 1 | 2 | 3 | 4 | 5 |
| 12. Students revisit and revise their solutions/responses to open-ended problems. | 1 | 2 | 3 | 4 | 5 |
| 13. Mathematics is integrated into instructional activities in other subject areas. | 1 | 2 | 3 | 4 | 5 |
| 14. Homework involves problem sets that reinforce basic skills. | 1 | 2 | 3 | 4 | 5 |

Please refer to the scale below to indicate the amount of student exposure to the following math content.

| | Never | One Lesson | Two Lessons | More Than 2 Lessons | Complete Unit(s) Many Lessons |
|---|---|---|---|---|---|
| 15. Students represent and compare quantities using manipulatives and visual representations. | 1 | 2 | 3 | 4 | 5 |
| 16. Students collect, organize, and represent data in charts, tables or graphs. They write about their analysis and interpretation of data. | 1 | 2 | 3 | 4 | 5 |
| 17. Classroom activities deal with understanding and using coordinates and coordinate systems. | 1 | 2 | 3 | 4 | 5 |
| 18. Classroom activities focus on part-to-whole relationships and visual representations of fractions. | 1 | 2 | 3 | 4 | 5 |
| 19. Students create and read maps (for example, they use directions, locate landmarks, estimate distance, and interpret legends). | 1 | 2 | 3 | 4 | 5 |
| 20. Students create and interpret schedules involving time and other dimensions. | 1 | 2 | 3 | 4 | 5 |

## B. Teacher Experiences/Opinion

Please read the following statements and circle the response that best indicates your view.

| | | Strongly Disagree | Disagree | Partially Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1. | It is important to meet with a group or team of teachers regularly to discuss mathematics content and instructional strategies. | 1 | 2 | 3 | 4 | 5 |
| 2. | In my class, I have altered the way students "do" mathematics to correspond to the 1992 Mathematics Framework. (For example, collaborative work, writing about math, and extended tasks or investigations). | 1 | 2 | 3 | 4 | 5 |
| 3. | I have ample opportunity to review and discuss examples of problems and student work related to the content and standards in the 1992 Mathematics Framework. | 1 | 2 | 3 | 4 | 5 |
| 4. | In the past two years, the district has provided professional development opportunities that enhanced my understanding and teaching of mathematics. | 1 | 2 | 3 | 4 | 5 |
| 5. | I have altered the content of my instructional units to correspond to content covered by the CBAAM. | 1 | 2 | 3 | 4 | 5 |
| 6. | There is adequate time to teach basic computational skills and more complex problem solving. | 1 | 2 | 3 | 4 | 5 |
| 7. | Textbooks are the primary source of instructional guidance and classroom activities. | 1 | 2 | 3 | 4 | 5 |
| 8. | In my class, I have altered the way students "do" mathematics to correspond to the tasks on the CBAAM. | 1 | 2 | 3 | 4 | 5 |
| 9. | Classroom activities are often based on the application of mathematics to real world situations. | 1 | 2 | 3 | 4 | 5 |
| 10. | I am confident in my ability to develop and use complex problems and investigations in my teaching. | 1 | 2 | 3 | 4 | 5 |

| | Strongly Disagree | Disagree | Partially Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| 11. Teachers were clearly informed of the general content and format of tasks on the CBAAM. | 1 | 2 | 3 | 4 | 5 |
| 12. I think recent changes in mathematics instruction and assessment are necessary and important. | 1 | 2 | 3 | 4 | 5 |
| 13. I have altered the content of my instructional units to correspond to content described in the 1992 Mathematics Framework. | 1 | 2 | 3 | 4 | 5 |
| 14. Feedback about student performance on the CBAAM will be valuable in my future instructional planning. | 1 | 2 | 3 | 4 | 5 |
| 15. Prior to CBAAM administration, I reviewed the generic scoring rubric with my students. | 1 | 2 | 3 | 4 | 5 |
| 16. Tasks on the CBAAM mesh well with the type of problems students are exposed to in my math classes. | 1 | 2 | 3 | 4 | 5 |
| 17. In recent years, I have been involved in valuable professional development experiences (in math) outside of the district. | 1 | 2 | 3 | 4 | 5 |
| 18. Students will benefit by reviewing and understanding their performance on the CBAAM. | 1 | 2 | 3 | 4 | 5 |
| 19. My students were well prepared for the content and task format on the CBAAM. | 1 | 2 | 3 | 4 | 5 |
| 20. The time and effort spent developing and scoring the CBAAM is worthwhile in terms of the benefits to teachers and students. | 1 | 2 | 3 | 4 | 5 |
| 21. The district should only use assessment results to provide feedback to individual students and teachers. | 1 | 2 | 3 | 4 | 5 |
| 22. Administration of the CBAAM and similar statewide assessments will motivate teachers to change instructional practices. | 1 | 2 | 3 | 4 | 5 |
| 23. I would like to have more systematic interaction with other teachers that are developing and using alternative assessments. | 1 | 2 | 3 | 4 | 5 |

## C. Classroom Assessment

Please use the scale to indicate how often you use the assessment tools listed below.

| | Never | Rarely | Monthly | Weekly | Daily |
|---|---|---|---|---|---|
| 1. Open-ended tasks | 1 | 2 | 3 | 4 | 5 |
| 2. Portfolio | 1 | 2 | 3 | 4 | 5 |
| 3. Teacher-made tests and quizzes | 1 | 2 | 3 | 4 | 5 |
| 4. Textbook tests and quizzes | 1 | 2 | 3 | 4 | 5 |
| 5. Developmental scales | 1 | 2 | 3 | 4 | 5 |
| 6. Investigations | 1 | 2 | 3 | 4 | 5 |
| 7. Projects | 1 | 2 | 3 | 4 | 5 |
| 8. Exhibitions | 1 | 2 | 3 | 4 | 5 |
| 9. Anecdotal records | 1 | 2 | 3 | 4 | 5 |
| 10. Holistic or analytic scoring rubrics | 1 | 2 | 3 | 4 | 5 |
| 11. Observational checklists | 1 | 2 | 3 | 4 | 5 |
| 12. Student self-assessment or reflection | 1 | 2 | 3 | 4 | 5 |
| 13. Oral questions/interviews | 1 | 2 | 3 | 4 | 5 |
| 14. Attitude surveys | 1 | 2 | 3 | 4 | 5 |
| 15. Peer assessment | 1 | 2 | 3 | 4 | 5 |

Please use this space to provide additional comments about the CBAAM, your opinion of the assessment project, and what you think the project has or has not accomplished.

## Interview Request

Far West Laboratory would like to interview third and sixth grade teachers in an effort to obtain more detailed information about the relationship among current instructional practices in mathematics, teacher professional development opportunities, and the CBAAM assessment project. Interviews will take place in February and be conducted after classes at school sites. Interview times will be arranged in consultation with participating teachers. Interviews will take 60-90 minutes and Far West Laboratory will pay a $40.00 honorarium to each participant. Teachers will be selected based on differences in background and CBAAM development history. Therefore, some interested teachers may not be contacted for interviews.

The interviews will be audiotaped and transcribed. Following transcription recordings will be destroyed. The source of all data collected will be coded to insure confidentiality. Only the Far West Laboratory CAC project staff will have access to the data. In no case will data or the dissemination of study results be linked to actual teachers, or schools. Upon completion, study findings will be shared with teachers and district staff.

Please Check one of the following to indicate your interest:

_____ Yes, I would like to participate in a follow-up interview. Far West Laboratory Staff can contact me a the following number(s):

Name_____ Phone_____

_____

_____ No, I am not interested in further participation.

If you have questions about the survey or interviews, please feel free to call Peter Ryan at Far West Laboratory (415-565-3031).

# Guiding Questions: Interview

Many teachers feel that the CBAAM is having an impact on how they teach mathematics while others don't see an impact. What is your experience in your classroom and school?

Were you satisfied with student performance on the assessment? How did you use the results in your classroom? What was the students reaction?

In your opinion is the assessment helping teachers and students move mathematics instruction and performance in the direction of the state frameworks? Why or why not?

What do you think needs to happen in order to enhance teacher and student capacity to successfully engage in tasks/activities like those on the CBAAM? What kind of staff development and student experience is necessary?

What part of your mathematics program does the CBAAM measure particularly well? What do you teach that the assessment doesn't measure? What changes would you like to see?